

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS**

AMAZIN' RAISINS INTERNATIONAL, INC.  
an Ontario, Canada corporation,

Plaintiff,

V.

Civ. Action No. 04-12679-MLW

OCEAN SPRAY CRANBERRIES, INC.,  
a Delaware corporation,

Defendant.

**DECLARATION OF CHRISTOPHER J. SORENSON  
IN SUPPORT OF PLAINTIFF’S OPPOSITION TO DEFENDANT’S  
MOTION FOR SUMMARY JUDGMENT OF NONINFRINGEMENT**

I, Christopher J. Sorenson, having been duly sworn, depose and say as follows:

1. I am an attorney with the law firm of Merchant & Gould, resident in Minneapolis, Minnesota. I represent Plaintiff Amazin' Raisins International, Inc. ("Amazin' Raisins"), in the above-captioned action. This declaration is respectfully submitted in support of the accompanying Opposition to Defendant Ocean Spray Cranberries, Inc.'s. ("Ocean Spray") Motion for Summary Judgment of Noninfringement.

2. Attached hereto as Exhibit 1 is a true and accurate copy of the patent-in-suit, U.S. Patent No. 5,188,861.

3. Attached hereto as Exhibit 2 are true and accurate copies of excerpts from the February 7, 2006 deposition of Harold Mantius.

4. Attached hereto as Exhibit 3 is are true and accurate copies of excerpts from the December 15, 2005 deposition of Michael Scott.

5. Attached hereto as Exhibit 4 is a true and accurate copy of an Examiner's Action

from the United States Patent & Trademark office dated, October 31, 1990.

6. Attached hereto as Exhibit 5 is a true and accurate copy of U.S. Patent No. 5,320,861.

7. Attached hereto as Exhibit 6 is a true and accurate copy of *Palomar Med. Tech., Inc. v. Gen. Hospital Corp.*, No. 02-10258; 2005 U.S. Dist LEXIS 32117, at \*7 (D. Mass. December 12, 2005).

8. Attached hereto as Exhibit 7 is a true and accurate copy of *Edwards Sys. Tech., Inc. v. Digital Control Sys., Inc.*, 2004 U.S. App. LEXIS 9679, \*13-24d (Fed. Cir. May 18, 2004).

9. Attached hereto as Exhibit 8 is a true and accurate copy of *nCube Corp. v. Seachange Int'l, Inc.*, Civ. 03-1341, 2006 U.S. App. LEXIS 631 at, \*6-7 (Fed. Cir. Jan. 9, 2006).

10. Attached hereto as Exhibit 9 is a true and accurate copy of excerpts from the book entitled *Practical Dehydration*, by Maurice Greensmith (1998, Woodhead Publishing Ltd, pp. 175-176, 184-186).

11. Attached hereto as Exhibit 10 is a true and accurate copy of an Opinion Letter from Dorothy Whelan to Alana Sharenow dated, June 23, 2003.

12. Attached hereto as Exhibit 11 is a true and accurate copy of *Whirlpool Corp. v. LG Electronics, Inc.*, 2004 U.S. Dist. LEXIS 28447, \*28-30 (W.D. Mich. 2004).

I declare under the penalty of perjury that the foregoing is true and accurate.

Executed on this 10th day of February 2006.

s/Christopher J. Sorenson

Christopher J. Sorenson

# United States Patent [19]

Mazin et al.

[11] Patent Number: 5,188,861

[45] Date of Patent: Feb. 23, 1993

[54] PROCESS FOR PREPARING A DRIED  
FRUIT PRODUCT

[75] Inventors: Jack G. Mazin, Maple; Amir Lalji,  
Weston, both of Canada

[73] Assignee: Royal Domaine Inc., Concord,  
Canada

[21] Appl. No.: 530,863

[22] Filed: May 31, 1990

[51] Int. Cl.<sup>5</sup> ..... A23L 1/212

[52] U.S. Cl. .... 426/640; 426/639

[58] Field of Search ..... 426/640, 639

[56] References Cited

## U.S. PATENT DOCUMENTS

1,609,720 12/1926 Humphrey ..... 426/640  
1,717,489 6/1929 Barlow ..... 426/640  
4,542,033 9/1985 Agarwala ..... 426/640 X

## FOREIGN PATENT DOCUMENTS

61-216641 9/1986 Japan ..... 426/640

## OTHER PUBLICATIONS

Furia, CRC Handbook of Food Additives, vol. I, 1972,  
CRC Press Inc.: Cleveland, pp. 225-253.

Primary Examiner—Joseph Golian

Attorney, Agent, or Firm—Bereskin & Parr

[57] ABSTRACT

A process for preparing a flavored dried fruit product having a flavor which does not substantially correspond to the natural flavor of the dried fruit is provided. As a first step, a dried fruit is treated with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid, and fumaric acid in an amount and for a period of time which is sufficient to substantially remove the natural flavor of the dried fruit. As a second step, the treated dried fruit is then dehydrated to the desired moisture content. The dried fruit is treated during the first step or after the second step with a flavoring agent having a flavor which does not correspond to the natural flavor of the dried fruit. The flavoring agent is employed in an amount and for a period of time which is sufficient to impart to the dried fruit a flavor which is substantially the same as the flavoring agent.

7 Claims, No Drawings

## PROCESS FOR PREPARING A DRIED FRUIT PRODUCT

### BACKGROUND OF THE INVENTION

The invention relates to the field of dry fruits, and particularly, to a new dried fruit product having a flavor which does not substantially correspond to the natural flavor of the dried fruit, and a process for preparing the product.

Dried fruits such as raisins, prunes, apples, apricots, and peaches are recognized as highly nutritious food products. Raisins, for example, are a good source of iron, and they supply calcium, magnesium, potassium, phosphorous, B vitamins, protein and dietary fibre. (Foods and Food Production Encyclopedia, Considine, D.M. ed., Van Nostrand Reinhold Company, New York 1982, pages 1639-1942). Dried fruits are utilized as snack foods, confectionaries, etc., and as ingredients in foods such as snack foods, confectionaries, biscuits, cookies, cakes, dairy products, cereals, etc.

There is a need for dried fruit products which are inexpensive, have an appealing taste, aroma and texture, and are nutritious. Fruit leather products which are commercially available are expensive and contain ingredients such as sweeteners which make them nutritionally less desirable. Many of the sun dried or artificially dried fruits commercially available do not have an appealing taste, aroma or texture and therefore are not readily consumable as snack foods or readily incorporated into foods such as confectionaries, biscuits, cereals, etc.

There is also a need for a new and useful process which is capable of producing dried fruit products which retain more of their shape, size and natural nutrients, while imparting desirable taste, texture and aroma qualities to the dried fruit products.

U.S. Pat. No. 1,717,489 (issued Jun. 18, 1929 to Barlow) discloses a method of changing the flavor of dried fruits comprising combining the expressed juice of one fruit with another fruit which has been sun-dried or evaporated or which is in the process of drying. In one method disclosed a dry or drying fruit is immersed in the fruit juice of another fruit for a short time and then put again to dry; the process being repeated until the desired result is fully obtained. The method disclosed in the reference leaves much to be desired in terms of processing efficiency and processing costs and the tendency of the fruit juice to ferment over time may result in a product having an alcoholic taste. In addition, the absence of preservatives in the fruit juice and/or repeated applications of the fruit juice to the dry or drying fruit may introduce undesirable microorganisms into the dried fruit product shortening the shelf life of the product and more importantly, rendering the product harmful to consumers. Further, the repeated application of the fruit juice to the dry or drying fruit increases the sugar content resulting in a sticky product which is nutritionally less desirable. Repeated drying of the fruit also reduces the content of nutrients and volatiles in the fruit which effects the nutritional, and aroma and flavor qualities, respectively of the product.

### SUMMARY OF THE INVENTION

The present invention provides dried fruit products, particularly raisins, having flavors which do not correspond to the natural flavor of the dried fruits and having desirable nutritional, texture and aroma qualities; and a

process for preparing the dried fruit products. The improvements in the product attributes provided by the dried fruit products of the invention compared to prior art products is in texture, flavor, nutrition and aroma. The improvements are realized using the easily carried out process of the present invention.

Broadly stated, the present invention provides a process for preparing a flavored dried fruit product said process comprising:

- (a) treating a dried fruit with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid, in an amount and for a period of time which is sufficient to substantially remove the natural flavor of the dried fruit;
- (b) dehydrating the treated dried fruit to obtain a desired moisture content; and,
- (c) treating the dried fruit during step (a) or after step (b) with a flavoring agent having a flavor which does not substantially correspond to the natural flavor of the dried fruit, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the dried fruit a flavor which is substantially the same as the flavoring agent; and so forming a flavored dried fruit product having a flavor which is substantially the same as the flavor of said flavoring agent and having an outer surface which is substantially non-sticky whereby the flavored dried fruit product may be easily handled.

In one embodiment of the invention, a process for preparing a flavored raisin product is provided which process comprises a one step rehydration of raisins in a flavor solution comprising water, an acidulant, and a flavoring agent, and optionally comprising one or both of a sweetening agent and a coloring agent, said flavor solution being employed in an amount of about 10 to 100% by weight of final product, said acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid and being employed in an amount of 0.1 to 2.5% by weight of final product, said flavoring agent having a flavor which does not substantially correspond to the natural flavor of the raisins, said rehydration step being employed for a period of time to permit the flavor solution to stabilize in the raisins and to impart to the raisins a flavor which is substantially the same as the flavoring agent, and washing the rehydrated raisins to substantially remove any residual of the flavor solution on the outer surface or skin of the raisins, and a one step dehydration of the washed rehydrated raisins to obtain a desired moisture content, and so forming a flavored raisin product having a flavored meat comprising the flavor of the flavoring agent, and having an outer surface which is substantially non-sticky whereby the raisin product may be easily handled.

In a second preferred embodiment of the invention, a process for preparing a flavored raisin product is provided which process comprises treating raisins with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid, said acidulant being employed in an amount and for a period of time sufficient to provide raisins wherein the natural flavor of the raisins is substantially removed; dehydrating the so treated raisins to obtain a desired moisture content in the raisins, and treating the dehydrated raisins with a

flavoring agent having a flavor which does not substantially correspond to the natural flavor of the raisins, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the raisins a flavor which is substantially the same as the flavoring agent; and so forming a flavored raisin product having a flavor which is substantially the same as the flavor of the flavoring agent and having an outer surface which is substantially non-sticky whereby the flavored raisin product may be easily handled.

The process of the invention, by employing minimal steps, economically decreases the time and ingredients required to obtain a dried fruit product with a desired taste, aroma and texture. The processing temperatures and times also make it possible to produce flavored dried fruit products having little or no loss of natural nutrients. Another feature of the present invention is the improved flow properties attained when the process is employed. Using conventional methods such as Barlow, the dried fruit products may form lumps which cause difficulties in handling, packaging, obtaining exact product weights, and incorporating into other food stuffs. It is also possible using the present invention to obtain a flavored dried fruit product which is more uniform in size and shape when compared to the prior art. In addition, the presence of the acidulant, significantly decreases the possibility of contamination and fermentation occurring.

The preferred process of the invention has a number of additional advantages. There is no heating of the flavoring agent so there is little or no loss of the volatile constituents of the flavoring agent which contribute to the flavor and aroma of the final product. Thus, the flavor and aroma of the flavoring agent is more readily retained in the flavored dried fruit product. The flavor and aroma will also penetrate the dried fruit on storage and provide the flavored dried fruit with a more well-developed flavor and aroma. In the preferred process of the invention, no sweetening agent is contacted with or applied to the dried fruit providing a more nutritionally desirable product. The absence of added sweetening agent in the preferred process also provides a product with superior flow properties which makes the product easy to handle, facilitating its use as a consumer product or in further processing as an ingredient in other food stuffs.

The invention also relates to flavored dried fruit products, particularly flavored raisin products produced by the processes of the invention. The flavored dried fruit products of the invention have a more appealing taste, aroma and texture than conventional dried fruit products and thus may be more readily consumable as snack foods or more readily incorporated into foods such as confectionaries, biscuits, cereals, etc.

#### DETAILED DESCRIPTION OF THE INVENTION

The dried fruits which may be flavored employing the processes of the invention include peach, apple, pear, raisins, prunes, apricots and cherries. Any dried fruit which contains between about 10% to 18% moisture may be employed. The process can be employed on whole or sectioned pieces of dried fruit.

Preferably the dried fruit is a raisin including Thompson seedless raisins, golden seedless raisins, muscat raisins or sultana raisins. The variety of raisin to be used in the processes of the invention will be determined by the desired end product color. Particularly preferred raisins

to be used in the processes of the invention are Australian sultanas, VISTA™ raisins from California, seeded raisins from Australia and Dunas seedless raisins from Mexico.

The processing of many of the different dried fruits will require conditions specifically adapted to the dried fruit. The following description will be restricted to the conditions which are particularly suitable for preparing raisin products but it will be understood that persons skilled in the art, given the particular process conditions and steps set forth in this general description as well as in the Examples, could readily adapt the processes of the invention to other dried fruits.

As hereinbefore mentioned, in one embodiment of the invention, a process is provided for preparing a flavored raisin product which includes a one step rehydration of the raisins in a flavor solution. The amount of flavor solution employed is about 10 to 100% by weight of the final product, preferably about 15 to 20% by weight of the final product. The raisins and flavor solution may be mixed, without breaking up the raisins, in a mixer, for example a Hobart. The raisins are rehydrated in the flavor solution for a sufficient time to permit the flavor to stabilize in the raisins; in general, about 3 to 48 hours, preferably 4 to 6 hours, at about 70° to 120° F. The raisins and flavor solution may also be mixed in a steam kettle with a vacuum pump. The raisins and flavor solution are mixed without breaking up the raisins for 5 to 10 minutes, preferably 7 minutes, and then a vacuum of about 15" to 30", preferably 21" to 28" of mercury is applied for about 2 to 4 minutes.

The flavor solution contains water, an acidulant, a flavoring agent and, if desired, it may contain one or both of a sweetening agent or a colouring agent. As discussed above, the acidulant lowers the pH of the flavor solution, significantly decreasing possible contamination by undesirable microorganisms and fermentation. The acidulant also substantially removes the natural flavor of the dried fruit. In addition, the acidulant may also give the dried fruit product a tart taste and assist in breaking down any alkali film that may be on the outer surface of the raisins due to prior processing of the raisin which may inhibit absorption of the flavoring agent. Among the suitable acidulants which may be used in the processes of the invention are tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid, or fumaric acid. The selection of a particular acidulant will be made with knowledge of the flavor compatibility of the acidulant with the particular dried fruit to be flavored and the flavoring agent. Thus, flavoring of a particular dried fruit or even a particular raisin using the processes of the invention will require a balancing of the flavoring agent and acidulant to achieve a desired result. For example, the preferred acidulant in the case of flavoring seeded raisins from Australia with cherry flavor is malic acid. Generally, the acidulant is present in an amount of 0.1 to 2.5% by weight of final product. The desired result as well as the nature of the acidulant will determine the actual amount used in any particular incident.

The flavoring agent used in the processes of the invention has a flavor which does not substantially correspond to the flavor of the fruit which is to be flavored in accordance with the processes of the invention. The flavoring agent may be one or more of a natural flavor or an artificial flavor or a combination of natural and artificial flavors. Natural flavors include fruit juices, concentrates and commercially available natural fla-



vors, for example Fries & Cino, Cherry Flavor No. 96243; Naarden's Natural Banana Flavor No. D014654; and BBA's Natural Lemon/Lime Flavor No. 5-9591. Among the artificial flavors that may be used in the process of the invention are Florasynth's Artificial Raspberry Flavor No. W388076, IFF Artificial Pineapple Flavor No. IC578122, BBA's Artificial Coconut Flavor No. M5, IFF's Artificial Pineapple Flavor No. IC578122 combined with BBA's Artificial Coconut Flavor M5 (Pina Colada), and FDO Artificial Passion Fruit Flavor No. 987114. Other natural or artificial fruit flavors that may be used in the process of the invention are orange, grapefruit, tangerine, guava and kiwi. Non-fruit flavors such as peanut butter and cinnamon, may also be used in the process of the invention. The flavoring agent when employed in the first embodiment of the process of the invention should be heat stable at the temperatures at which the process of the invention is carried out. Generally the flavoring agent is present in an amount of about 0.05 to 3% by weight of final product. The desired result as well as the nature of the flavoring agent will determine the actual amount used in any particular incident. The flavoring agent may additionally include vitamin and mineral premixes such as vitamin A, vitamin C, calcium, sodium, thiamine, riboflavin, vitamin B, vitamin B<sub>2</sub>, etc.

If desired, the flavor solution may contain one or both of a sweetening agent or a coloring agent. The sweetening agent may be a natural sweetener such as sucrose, fructose or glucose or an artificial sweetening agent such as aspartame. Generally, for a natural sweetening agent an amount of about 0 to 15% by weight of the final product is employed. The coloring agent may be a natural or artificial coloring agent. The amount of coloring agent to be added can be determined by visual requirements.

The flavor solution may additionally contain a humectant such as glycerol and sorbitol. Sodium citrate may also be added to the flavor solution to provide a more tart taste, for example when preparing a lemon/lime flavored dried fruit product.

The treated raisins in the first embodiment of the process of the invention are dehydrated using methods known in the art such as air-oven drying and vacuum drying. In particular, the treated raisins may be dehydrated in a home dehydrator, with adequate ventilation of about 20 m.p.h. wind velocity for a period of about 4 to 6 hours at about 125° to 175° F, preferably 5 to 6 hours at 145° to 150° F, till about 12% moisture remains in the product. The treated raisins prior to drying may also be subjected to a vacuum of about 15" to 30", preferably 21" to 28" of mercury for about 2 to 4 minutes to hasten the absorption of the flavor solution. If the flavor solution contains a sweetening agent it is advantageous to wash the treated raisins prior to drying.

In accordance with a preferred embodiment of the invention, a process is provided for preparing a flavored raisin product which comprises treating raisins with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid said acidulants being employed in an amount and for a period of time sufficient to provide raisins wherein the natural flavor of the raisin is substantially removed; dehydrating the so treated raisins to obtain a desired moisture content in the raisins, and treating the dehydrated treated raisins with a flavoring agent having a flavor which does not substantially correspond to the natural flavor of the

raisins, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the raisins a flavor which is substantially the same as the flavoring agent; and so forming a flavored raisin product having a flavor which is substantially the same as the flavor of the flavoring agent and having an outer surface which is substantially non-sticky whereby the flavored raisin product may be easily handled.

As a first step in the second preferred embodiment of the invention, the raisins are treated with an acidulant. The starting raisins are mixed with an aqueous solution containing the acidulant, in a mixer such as a Hobart mixer. The acidulant is employed in an amount, preferably 0.1 to 2.5% by weight of final product, and for a sufficient time to substantially remove the natural flavor of the raisins; in general about 2 to 3 hours, preferably 2.5 hours. The mixing is carried out at a temperature of about 20° C. to 50° C., preferably 20° C. If the starting raisins are coated with oil it is advantageous to wash the raisins prior to mixing to remove the oil coat. The acidulant treated raisins are then dehydrated to obtain a desired moisture content in the treated raisins. In particular, the raisins may be dehydrated in a home dehydrator, with adequate ventilation of about 20 m.p.h. wind velocity for a period of about 1 to 3 hours, preferably 2 hours, at 145° F. to 150° F., preferably about 145° F., until about 12 to 18% moisture, preferably 15% remains in the product. The raisins may be vacuum dried by subjecting to a vacuum of about 18" to 30", preferably 28" of mercury for about 1 to 3 hours, preferably 2 hours, to provide an internal product temperature of 110 to 160° F., preferably 110 to 120° F., until about 12 to 18% moisture, preferably 15% remains in the product. The acidulant treatment step and dehydration step may also be carried out in an apparatus such as a Rota-Cone Dryer and Processor (Paul O. Abb Inc., Little Falls, N.J.)

The dehydrated treated raisins are mixed with a flavoring agent. The flavoring agent is employed in an amount and for a period of time sufficient to impart to the dehydrated raisins a flavor which is substantially the same as the flavoring agent. Generally, the dehydrated raisins and flavoring agent are mixed in a mixer such as a tumble mixer, to uniformly coat the dehydrated raisins. Generally an amount of flavoring agent which substantially coats the raisins is employed and in particular the flavoring agent may be present in an amount of about 0.5 to 3% by weight of the final product. In the preferred process, of the invention no sweetening agents are contacted or applied to the raisins.

The nature of the acidulants and flavoring agents which may be used in the preferred process of the invention are the same as the acidulants and flavoring agents hereinbefore described for the first embodiment of the process of the invention.

The dried raisins prepared according to the process of the invention can be used as a snack food or confectionery or an ingredient in products such as cakes, cookies, snack foods, confectioneries, dairy products, etc. The dried raisins may also be coated with chocolate.

The following non-limiting examples are illustrative of the present invention:

#### EXAMPLE 1

A cherry flavor solution containing 4.0g malic acid, 3.0g Fries & Cino Natural Cherry Flavor No. 96243 and 73.0g water was added to 400g of seeded raisins from Australia. The mixture was allowed to stand with inter-

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mittent mixing, for 6 hours at room temperature (70° F.) to allow the solution to be absorbed into the raisins. The treated raisins were then dehydrated in a home dehydrator at 145° F. with adequate ventilation of about 20 m.p.h. wind velocity for a period of 5- to 6 hours to 12% moisture remaining in the product. The dried treated raisins were then cooled. The resultant product had a desirable cherry flavor.

#### EXAMPLE 2

The cherry flavor solution as described in Example 1 was added to 400g of seeded raisins from Australia and mixed in a Hobart mixer for about 10 minutes to allow uniform dispersion of the solution into the raisins. The mixture was then subjected to a vacuum of 21" to 28" of mercury for about 4 minutes to hasten the absorption of the solution. The treated raisins were then dehydrated as described in Example 1. The resultant product had a desirable cherry taste which was similar to the product prepared in accordance with the procedure as described in Example 1.

#### EXAMPLE 3

A strawberry flavor solution containing 1.20g of citric acid, 0.80g Florasynth Artificial Strawberry Flavor No. WL16103 and 78.0g of water was added to 400g of seeded raisins from Australia. Subsequent processing was carried out as described in Example 1 or Example 2 and the raisin products resulting for each process had a similar desirable strawberry taste.

#### EXAMPLE 4

A raspberry flavor solution containing 2.25g citric acid, 2.50g Florasynth Artificial Raspberry Flavor No. W388076 and 75.25g of water was added to 400g of seeded raisins from Australia. Subsequent processing was carried out as described in Example 1 or Example 2 and the raisin products resulting from each process had a similar desirable raspberry taste.

#### EXAMPLE 5

A banana flavor solution containing 1.00g citric acid, 7.00g Naarden Natural Banana Flavor No. DQ14654 and 72.00g of water was added to 400g of VISTA raisins from California. Subsequent processing was carried out as described in Example 1 or 2 and the raisin products resulting from each process had a similar desirable banana taste.

#### EXAMPLE 6

A pina colada flavor solution containing 3.0g citric acid, 4.0g IFF Artificial Pineapple Flavor No. IC5788122 0.4g BBA Artificial Coconut Flavor No. M%, and 72.6g of water was added to 400g of VISTA raisins from California. Subsequent processing was carried out as described in Example 1 or 2 and the raisin products resulting from each process had a similar desirable pineapple taste.

#### EXAMPLE 7

A lemon./lime flavor solution containing 5.0g citric acid, 0.5g sodium citrate, 1.5g BBA Natural Lemon/-Lime Flavor No. 5-9591 and 73.0g of water was added to 400g of Australian sultana raisins. Subsequent processing was carried out as described in Example 1 or 2 and the raisin products resulting from each process had a similar desirable lemon/lime taste.

#### EXAMPLE 8

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A passion fruit flavor solution containing 3.0g citric acid, 0.8g F.D. & O Artificial Passion Fruit Flavor No. 987114, 8.0g passion juice concentrate and 68.2g of water was added to 400g of VISTA raisins from California. Subsequent processing was carried out as described in Example 1 or 2 and the raisin products resulting from each process had a similar desirable passion fruit taste.

#### EXAMPLE 9

A 2000g sample of Australian sultana raisins was treated with hydrogenated vegetable oil (0.5%) and then washed with hot water and dried. The washed raisins (2060g) were treated with 250ml of a 10% anhydrous citric acid solution for 2 hours and the resulting acidified raisins (2310g) were then dehydrated in a home dehydrator at 145° F. with adequate ventilation of about 20 m.p.h. wind velocity for a period of 3 hours. The resulting dehydrated raisin product (1970-1980g) was substantially free of any natural raisin flavor. A 0.4% flavor solution of Bush Brooke Allen Flavor #5-9591 was added to coat the dehydrated raisin product. The process was repeated using a 2000g sample of Thompson seedless raisins. An Orange Flavored raisin product was prepared employing the described process, using 2000g samples of each of Australian sultana raisins and Thompson seedless raisins and 250ml of an 8% anhydrous citric acid solution and a 0.7% flavor solution of cold pressed California orange oil (Seeley).

As a comparison, the process described in U.S. Pat. No. 1,717,489 to Barlow was also used to prepare lemon flavored and orange flavored raisins. In particular, 2000g samples of Australian sultana raisins and Thompson seedless raisins were washed with hot water and dried. The washed raisin samples (2060g) were then soaked in 250ml of either fresh lemon juice squeezed from Florida lemons or fresh orange juice squeezed from Swaziland oranges and then dehydrated in a home dehydrator at 145° F with adequate ventilation of about 20 m.p.h. wind velocity for a period of 3 hours. The resulting raisins retained their natural flavor characteristics.

The raisin product produced by the process of the invention had a superior orange or lemon flavor when compared to the raisins produced by the process disclosed in Barlow. No difference in the color of the raisin product of the invention and the raisins produced by the Barlow process was observed.

In the case of the orange flavored raisin product of the invention, it had a less sticky texture than the raisins produced using the Barlow process.

The sugar and acid content of the raisin products of the invention and the raisins produced using the Barlow process were calculated.

As shown in Table 1, the orange and lemon flavored raisins produced using the Barlow process have a lower acid content and a higher sugar content when compared to the orange and lemon flavored raisin product of the present invention. If the acid content of the Barlow raisins were increased by soaking the raisins in additional orange or lemon juice, this would necessarily substantially increase the sugar content of the raisins, which is not desirable.

TABLE 1

	Acid Content (%)	Sugar Content (%)
<u>Invention</u>		
Orange raisin product	1	71.2%*

TABLE 1-continued

	Acid Content (%)	Sugar Content (%)
Lemon raisin product Barlow	1.4	71.2%
Orange Raisins	0.08-0.28**	72%*
Lemon Raisins	0.72-1.05***	71.35-71.65

\*71.2% is total sugar content of raisins from General Foods Specifications. Minimum sugar content of orange juice is 6.4%. (The Structure and Composition of Foods, details re publication p. 690).

$$250 \text{ g} \times \frac{.64}{100} = 0.8\%$$

\*\*Minimum Citric Acid Content of Orange Juice is 0.64%. (The Structure and Composition of Foods, p. 690)

$$250 \text{ g} \times \frac{.64}{100} = 1.6/2000 = 0.08\% \text{ acidity}$$

\*\*\*Minimum Citric Acid Content of Lemon Juice is 5.74%. (The Structure and Composition of Foods, Vegetables, Legumes and Fruits, Vol. II, Winton, A.L., and K. B. Winton, John Wiley & Sons, Inc., London, p. 704).

$$250 \text{ g} \times \frac{5.74}{100} = 14.35/2000 = .007175 = 0.72\%$$

## EXAMPLE 10

A 2000g sample of Australian sultana raisins with hydrogenated vegetable oil coating (0.5%) were washed with hot water and dried. The washed raisins were treated with 250ml of an 8% malic acid solution for 2 hours and then dehydrated in a home dehydrator at approximately 145° F. with adequate ventilation of about 20 m.p.h. wind velocity for a period of 3 hours. The raisins may alternatively be dehydrated by vacuum drying by subjecting to a vacuum of about 28" of mercury for a period of 2 hours to provide an internal raisin temperature of approximately 110 to 160° F. The resulting dehydrated raisin product was substantially free of any natural raisin flavor. A 1.0% solution of Natural Cherry Flavor #77742 from F & C International was added to coat the dehydrated raisin product.

## EXAMPLE 11

A passion fruit raisin product was prepared employing the process described in Example 10 using 250ml of an 8% citric acid solution and a 0.6% solution of Artificial Flavor #987114 from Fritzsche, Dodge & Olcott.

## EXAMPLE 12

A pina colada raisin product was prepared employing the process described in Example 10 using 250ml of 0.8% citric acid and a solution containing 1.0% Artificial Pineapple #ICS-78122 from International Flavor & Fragrances and 0.1% Artificial Coconut #M5 from Bush Brooke Allen.

## EXAMPLE 13

A banana flavored raisin product was prepared employing the process described in Example 10 using 250ml of 0.8% citric acid and a 0.5% solution of Natural Banana Flavor #82641 from F & C International.

## EXAMPLE 14

A strawberry flavored raisin product was prepared employing the process described in Example 10 using 250ml of 1% malic acid and a solution of Strawberry No. 987148 from FD & O International.

While certain representative embodiments of the invention have been described herein for the purpose of illustration, it will be apparent to those skilled in the art that modifications therein may be made without departing from the spirit and scope of the invention.

We claim:

1. A process for preparing a flavored dried fruit product said process comprising:

(a) treating a dried fruit with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid, in an amount and for a period of time which is sufficient to substantially remove the natural flavor of the dried fruit;

(b) dehydrating the treated dried fruit to obtain a desired moisture content; and,

(c) treating the dried fruit during step (a) or after step (b) with a flavoring agent having a flavor which does not substantially correspond to the natural flavor of the dried fruit, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the dried fruit a flavor which is substantially the same as the flavoring agent;

and so forming a flavored dried fruit product having a flavor which is substantially the same as the flavor of the flavoring agent and having an outer surface which is substantially non-sticky whereby the flavored dried fruit product may be easily handled.

2. A process for preparing a flavored raisin product comprising a one step rehydration of raisins in a flavor solution comprising water, an acidulant, and a flavoring agent, and optionally comprising one or both of a sweetening agent and a colouring agent, said flavor solution being employed in an amount of about 10 to 100% by weight of final product, said acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid and being employed in an amount of 0.1 to 2.5% by weight of final product, said flavoring agent having a flavor which does not substantially correspond to the natural flavor of the raisins, said rehydration step being employed for a period of time to permit the flavor solution to stabilize in the raisins and to impart to the raisins a flavor which is substantially the same as the flavoring agent, washing the rehydrated raisins to substantially remove any residual of the flavor solution on the outer surface or skin of the raisins, and a one step dehydration of the washed rehydrated raisins to obtain a desired moisture content, and so forming a flavored raisin product having a flavored meat comprising the flavor of the flavoring agent, and having an outer surface which is substantially non-sticky whereby the raisin product may be easily handled.

3. A process for preparing a flavored raisin product, said process comprising treating raisins with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid, said acidulant being employed in an amount and for a period of time sufficient to provide raisins wherein the natural flavor of the raisins is substantially removed; dehydrating the so treated raisins to obtain a desired moisture content in the raisins, and treating the dehydrated raisins with a flavoring agent having a flavor which does not substantially correspond to the natural flavor of the raisins, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the raisins a flavor which is substantially the same as the flavoring agent; and so forming a flavored raisin product having a flavor which is substantially the same as the flavor of the flavoring agent and having an outer surface which is substantially



**11**

non-sticky whereby the flavored raisin product may be easily handled.

4. A process as claimed in claim 3, wherein the acidulant is employed in an amount of 0.1 to 2.5% by weight of final product and the flavoring agent is employed in an amount of .05 to 3% by weight of final product.

5. A process as claimed in claim 3 or 4 wherein the flavoring agent is one or more of a natural and an artificial cherry, strawberry, raspberry, banana, pineapple, coconut, lemon/lime, orange, grapefruit, tangerine, guava, kiwi, or passion fruit flavor.

6. A flavored raisin product produced by a process comprising treating raisins with an acidulant being selected from the group consisting of tartaric acid, malic acid, citric acid, ascorbic acid, phosphoric acid and fumaric acid, said acidulant being employed in an amount and for a period of time sufficient to provide so treated raisins wherein the natural flavor of the raisins is

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substantially removed; dehydrating the so treated raisins to obtain a desired moisture content in the raisins, and treating the dehydrated raisins with a flavoring agent having a flavor which does not substantially correspond to the natural flavor of the raisins, said flavoring agent being employed in an amount and for a period of time which is sufficient to impart to the raisins a flavor which is substantially the same as the flavoring agent; and so forming a flavored raisin product having a flavor which is substantially the same as the flavor of the flavoring agent and having an outer surface which is substantially non-sticky whereby the flavored raisin product may be easily handled.

7. A process as claimed in claim 1, wherein no sweetening agent is contacted with or applied to the dried fruit.

\* \* \* \* \*

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**UNITED STATES DEPARTMENT OF COMMERCE  
Patent and Trademark Office**

 Address : COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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07/530,863 05/31/90 MAZIN

J 027.010B

EXAMINER

GOLIAN, J

ART UNIT

PAPER NUMBER

132

DATE MAILED:

10/31/90

 ROGERS, BERESKIN & PARR  
BOX 401  
40 KING STREET WEST  
TORONTO, ONTARIO, CANADA  
M5H 3Y2

 This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on \_\_\_\_\_ ☐ This action is made final.

 A shortened statutory period for response to this action is set to expire 3 month(s), 0 days from the date of this letter.  
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

**Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:**

- |   |   |
|---|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited by Examiner, PTO-892. | 2. <input type="checkbox"/> Notice re Patent Drawing, PTO-948.                  |
| 3. <input type="checkbox"/> Notice of Art Cited by Applicant, PTO-1449.                 | 4. <input type="checkbox"/> Notice of Informal Patent Application, Form PTO-152 |
| 5. <input type="checkbox"/> Information on How to Effect Drawing Changes, PTO-1474.     | 6. <input type="checkbox"/> _____   |

**Part II SUMMARY OF ACTION**

- 1.
- ☒
- Claims
- 1-6
- are pending in the application.

Of the above, claims \_\_\_\_\_ are withdrawn from consideration.

- 2.
- ☐
- Claims \_\_\_\_\_ have been cancelled.

- 3.
- ☐
- Claims \_\_\_\_\_ are allowed.

- 4.
- ☒
- Claims
- 1-6
- are rejected.

- 5.
- ☐
- Claims \_\_\_\_\_ are objected to.

- 6.
- ☐
- Claims \_\_\_\_\_ are subject to restriction or election requirement.

- 7.
- ☐
- This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

- 8.
- ☐
- Formal drawings are required in response to this Office action.

- 9.
- ☐
- The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are
- ☐
- acceptable;
- ☐
- not acceptable (see explanation or Notice re Patent Drawing, PTO-948).

- 10.
- ☐
- The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_, has (have) been
- ☐
- approved by the examiner;
- ☐
- disapproved by the examiner (see explanation).

- 11.
- ☐
- The proposed drawing correction, filed \_\_\_\_\_, has been
- ☐
- approved;
- ☐
- disapproved (see explanation).

- 12.
- ☐
- Acknowledgement is made of the claim for priority under U.S.C. 119. The certified copy has
- ☐
- been received
- ☐
- not been received
- 
- ☐
- been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.

- 13.
- ☐
- Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

- 14.
- ☐
- Other

EXAMINER'S ACTION

 Sorenson Exhibit 4  
Page 1

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Art Unit 132

The furnished specification, claims and abstract are a poor machine copy. Of the many defects, the office copy has a black line running through the text on each page. Applicants are required to furnish a substitute copy and request cancellation of the furnished original. No new matter can properly be introduced.

The comma (,) in Table 1 should be changed to a period (.).

Forms of the word "flavour" throughout the Abstract, specification and claims should be changed to flavor to conform to normal usage in this country. See, for example, page 1, line 6.

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 1-6, all the claims in the case, are rejected under 35 U.S.C. § 103 as being unpatentable over Barlow in view of the

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Art Unit 132

Furia text and Agarwala.

Consistent with that taught in the instant specification in the paragraph bridging pages 1 and 2, Barlow teaches "a method of changing the flavour of dried fruits comprising combining the expressed juice of one fruit with another fruit which has been sun-dried evaporated or which is in the process of drying." Barlow is specific to raisins set forth in some of the claims as see, for example, page 1, line 9. Dried fruits are immersed in a juice to incorporate the flavor as see, for example, page 1, the paragraph bridging the two columns.

Barlow is deficient in not disclosing the use of accessory ingredients, e.g. acids. However, the claimed ingredients are known ingredients contributing their expected functional effect to the total composition.

The Furia text discloses that the claimed acids are known food additives of known properties. The text reference discloses that the claimed acids are common food additives.

Argawala discloses the preparation of infused fruit products. Sugars taught on by page 9, first complete paragraph of the specification are taught in the reference in column 4, penultimate paragraph. Acids of the type claimed are taught in column 4, last paragraph. Fruit juices, taught on page 8, lines 12 et seq. of the instant specification, are also taught in the reference at column 4, lines 66-68. Adjuvants such as color and



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Art Unit 132

flavor taught in the instant specification are disclosed in the applied reference at column 5, first complete paragraph.

To use the additives of the secondary references in the relation of Barlow for their expected functionality taught by the secondary references is considered a routine matter well within the ordinary skill of one in the art. The claims are considered to recite nothing more than an obvious recipe and see the pertinency of *In re Levin*, 84 USPQ 232.

It is noted that applicants assert in the specification, e.g. page 3, lines 4-9 and some of the claims that the treatment with acids "substantially remove the natural flavour of the dried fruit." Applicants' assertion seems highly doubtful. For example, the specification teaches in Example 9 a sorption process with a limited amount of acids. There is no good explanation why such minimal acid treatment would effect a removal of flavors. The applied Agarwala teaches an acid treatment without teaching the use of such acid to remove flavors. It is considered that applicants' assertion is without support and ignores the contribution of the acid to the total flavor profile.

Apart from the above, it is pointed out that obviousness does not require absolute predictability. The use of food acids, such as here claimed, is common and to use such acids for the expected functionality in the claimed environment would be

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Art Unit 132

routine and well within the ordinary skill of one in the art.

The two step process recited in some of the claims is not considered patentably significant. Barlow discloses a sequential treatment and to vary the process of Barlow for separate treatments with acid and flavor would be routine and well within the ordinary skill of one in the art.

The comparative showing in Example 9 has been considered but is not considered particularly pertinent to the full scope of that which is claimed. Moreover, that comparative showing does not address the rejection of the claims as applied.

Features variously recited in the different claims are considered obvious features or control limitations well within the determination of the ordinary worker in the art.

Claim 6, drawn to the product, is rejected under 35 U.S.C. § 103 as being unpatentable over Barlow.

Any difference in the product claimed and the product of the prior art is at best a difference in degree and not in kind. The recitation that the product is made by a new process, if the process were indeed new and patentable, does not impart patentability to an otherwise unpatentable product.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Humphrey is generally cumulative to the applied Barlow. The Japanese patent shows the functionality of vacuum in impregnating

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-6-

Art Unit 132

materials and shows impregnating fruit with sugars, organic acids, etc.

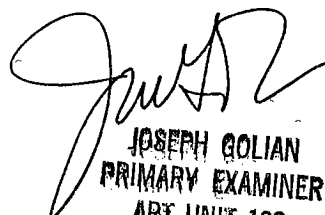
No claim is allowed.

Any inquiry concerning this communication should be directed to Joseph Golian at telephone number (703) 308-3830.

Golian/ad

October 26, 1990

October 30, 1990

  
JOSEPH GOLIAN  
PRIMARY EXAMINER  
ART UNIT 132

TO SEPARATE, HOLD TOP AND BOTTOM EDGES, SNAP-APART AND DISCARD CARBON

FORM PTO-892 (REV. 3-78)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		SERIAL NO. 530863		GROUP ART UNIT 132		ATTACHMENT TO PAPER NUMBER						
NOTICE OF REFERENCES CITED				APPLICANT(S)										
U.S. PATENT DOCUMENTS														
*		DOCUMENT NO.					DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE			
	A	1	6	0	9	7	2	0	12/1926	Humphrey	426	640		
	B	1	7	1	7	4	8	9	6/1929	Barlow	426	640		
	C	4	5	4	2	0	3	3	9/1985	Agarwala	426	640x		
	D													
	E													
	F													
	G													
	H													
	I													
	J													
	K													
FOREIGN PATENT DOCUMENTS														
*		DOCUMENT NO.					DATE	COUNTRY	NAME	CLASS	SUB-CLASS	PERTINENT SHTS. PP. DWG. SPEC.		
	L	6	2	1	6	6	4	1	9/1986	JAPAN	MONOSET	426	640	- all
	M													
	N													
	O													
	P													
	Q													
OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)														
	R	Furia, CRC Handbook of Food Additives, Vol. I, 1972, CRC Press Inc.: Cleveland, pages 225-253.												
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EXAMINER				DATE										
JOSEPH GOLIAN PRIMARY EXAMINER				10-10-90										
ART UNIT 132				* A copy of this reference is not being furnished with this office action. (See Manual of Patent Examining Procedure, section 707.05 (a).)										
				Sorenson Exhibit 4 Page 7										



US005320861A

**United States Patent** [19][11] **Patent Number:** **5,320,861****Mantius et al.**[45] **Date of Patent:** **Jun. 14, 1994**[54] **FRUIT EXTRACTION AND INFUSION**[75] **Inventors:** **Harold L. Mantius, Raynham; Peter R. Peterson, Taunton, both of Mass.**[73] **Assignee:** **Ocean Spray Cranberries, Inc., Lakeville-Middleboro, Mass.**[21] **Appl. No.:** **816,803**[22] **Filed:** **Jan. 3, 1992**[51] **Int. Cl.<sup>5</sup>** ..... **A23L 2/04; A23L 3/40**[52] **U.S. Cl.** ..... **426/599; 426/640; 426/655; 99/495**[58] **Field of Search** ..... **426/639, 655, 640, 599**[56] **References Cited****U.S. PATENT DOCUMENTS**

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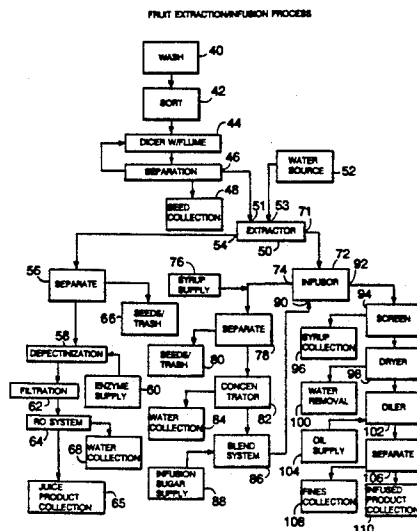
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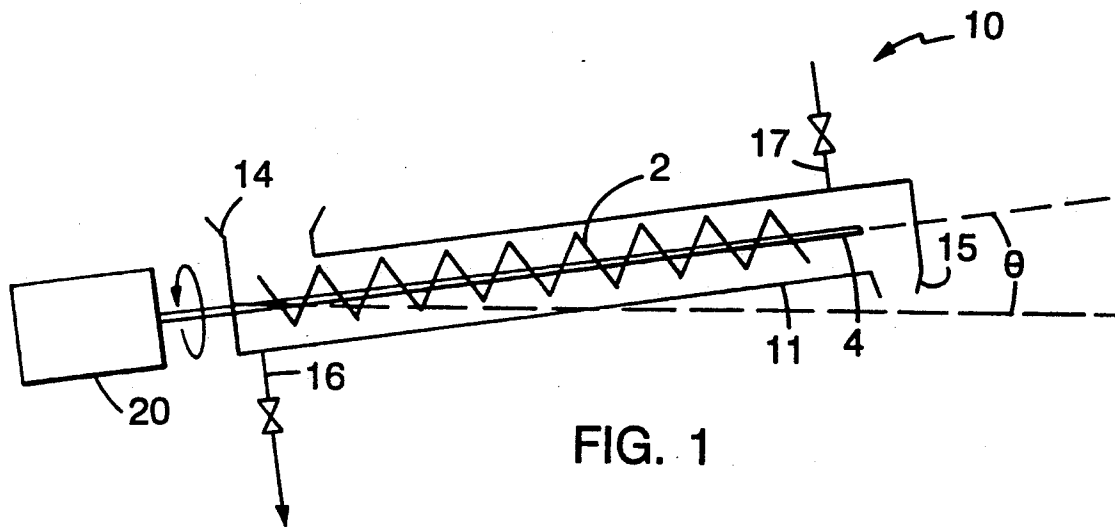
*Primary Examiner*—Carolyn Paden

*Attorney, Agent, or Firm*—Fish & Richardson

[57] **ABSTRACT**

Extraction, especially of firm fruit such as cranberries, with improved yields of high quality, low tannin juices by using an improved countercurrent extractor employing longitudinal members positioned between adjacent flights and reinfusion of decharacterized, extracted fruit pieces with infusion syrups, such as juices from fruits other than that extracted, to produce a fruit food product of various flavors having a desired level of inherent soluble fruit component, without the need to bleed off spent syrup as a byproduct.

**41 Claims, 3 Drawing Sheets**



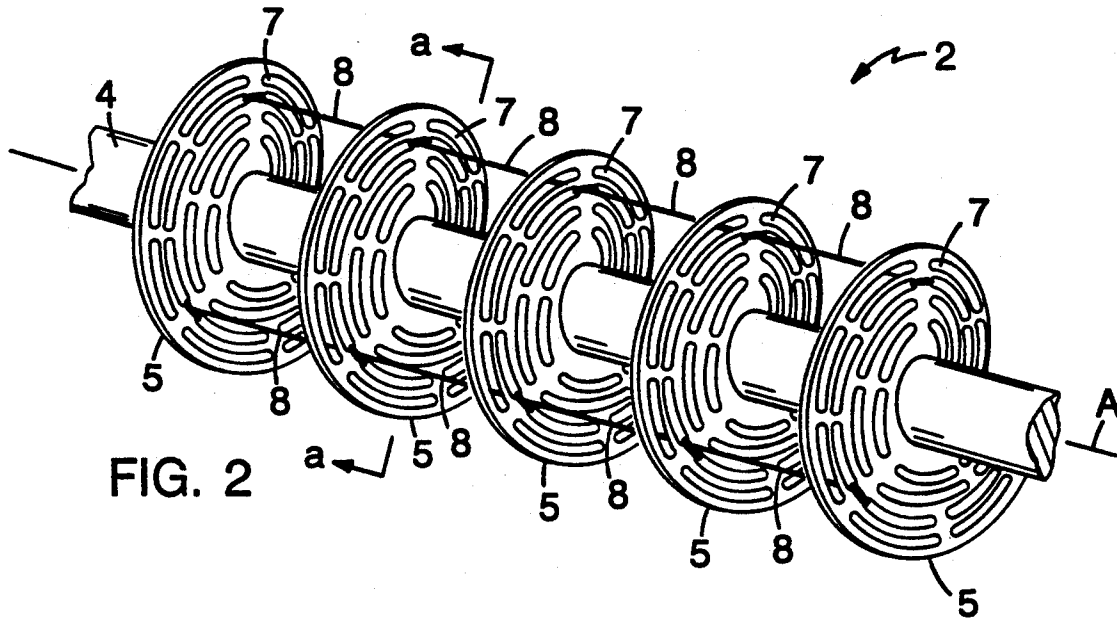


FIG. 2

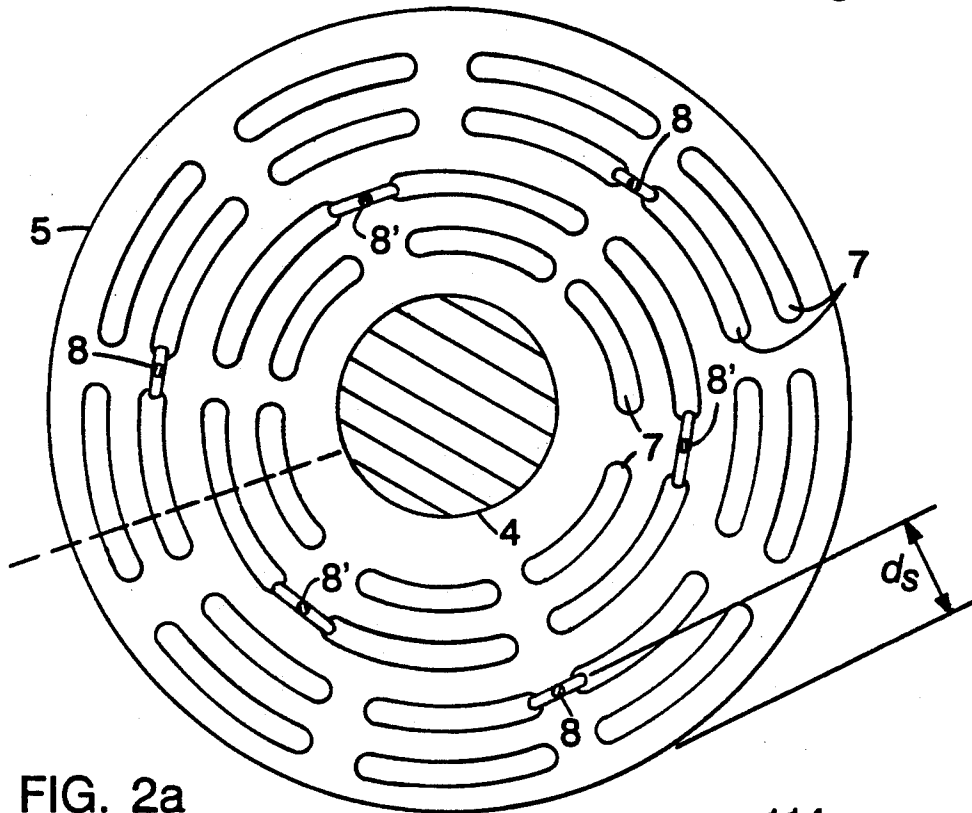


FIG. 2a

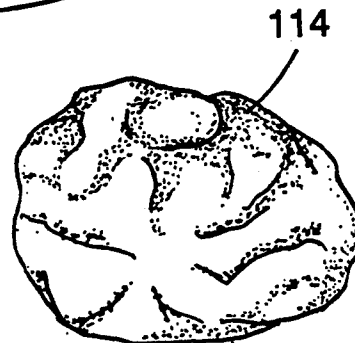


FIG. 4





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**FRUIT EXTRACTION AND INFUSION****FRUIT EXTRACTION AND INFUSION****Field of the Invention**

This invention relates to the extraction and infusion of fruits, especially cranberries, for producing various food products.

**BACKGROUND OF THE INVENTION**

Countercurrent extractors are used in the fruit processing industry for extraction of juices from solid fruit matter. The extractor includes a screw conveyor which urges fruit solids in a first direction, while extraction fluid flows in the opposite direction, extracting juice from the solids by osmosis. Other juice extraction methods used in the processing of cranberries include processes which utilize presses in conjunction with pressing aids (e.g., rice hulls) to produce a high quality single strength juice. Higher yield processes often utilize enzymatic treatment at elevated temperature to break down pectin in raw fruit prior to extraction and may result in a juice of substantially lower quality.

**SUMMARY OF THE INVENTION**

In aspects of the invention, fruits, especially firm berry fruits such as cranberries, are extracted by an improved countercurrent extraction apparatus resulting in improved and surprising yields of high quality juice, without the need for pressing aids, enzymatic treatments, non excessive heating of extraction liquid or extracted juice mixtures or the fruit itself. Further, because enzymes and high temperatures need not be used, the fruit maintains substantial physical integrity in a decharacterized form post extraction. The decharacterized fruit, a product of the juice extraction process, may be used as a carrier for various flavorings by infusing the decharacterized fruit with a flavored liquid infusion syrup. Particularly, infusion may be achieved with a countercurrent apparatus similar to that used for extraction with the decharacterized fruit being loaded as a solid and the infusion syrup, carrying the flavoring, introduced in a countercurrent fashion. The resulting infused food product, still maintaining substantial physical integrity of the original raw fruit, provides unique flavors by virtue of the various infusion fluids possible, such as fruit juices from fruits other than the fruit decharacterized. The infused fruit product may also maintain the characteristic flavor of the fruit itself to a desired degree.

In various aspects, a sequential, two-step process, extraction followed by infusion is taught herein, that provides particular advantages, especially over processes which simultaneously extract and infuse by soaking fruit in a liquid infusion syrup. In the latter processes, control over the level of natural or inherent soluble fruit component (the composition of materials that contribute to characteristic fruit flavor, including soluble solids such as combinations of sugars and other components, present in the fruit at natural relative levels) in the infused fruit product can be achieved by adjusting the ratio of infusion syrup to fruit, in order to extract the requisite amount of inherent soluble fruit component into the infusion medium, discharging a fraction of the medium as a relatively low value spent syrup byproduct and recycling the remaining fraction to infuse and extract more fruit. Recycling the spent syrup in its entirety causes the level of inherent soluble

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fruit component in the infusion syrup feed to asymptotically approach that of the fruit feed over time as the syrup is cycled through successive batches or a continuous flow of fruit and renders control over the formulation of the infused fruit product at any target level of inherent soluble fruit component below that characteristic of the fruit virtually impossible.

In the two-step process, on the other hand, the level of inherent soluble fruit component in the infused product can be controlled by the degree of extraction achieved in the extraction step and the degree of infusion of formulated infusion syrup achieved in the infusion step. Preferably, most of the inherent soluble fruit component is extracted from raw fruit to produce a large volume of high quality juice of high commercial value, with a predetermined amount of inherent soluble fruit component retained in the decharacterized fruit so that it maintains partially the natural fruit flavor. In the infusion step, the infusion syrup is formulated with inherent soluble fruit component (e.g. by using juice or juice concentrate) and non-inherent components (e.g. sugars, acids and/or other flavorings and components not present in the natural fruit or not present at the same relative levels as in the natural fruit) in such a manner as to control the formulation of the infused fruit product with respect to its inherent soluble fruit component without the need to bleed off spent syrup as a byproduct of the process. Preferably, there is no net extraction of the inherent component into the infusion media in the infusion step, i.e., the infusion syrup is formulated such that the level of inherent fruit component is equal to or greater than that in the decharacterized fruit. In preferred embodiments, the infusion is carried out with a countercurrent apparatus, and the spent syrup is concentrated to remove excess water and recycled in its entirety.

For example, raw fruit is extracted such that post extraction the decharacterized fruit contains a small amount, e.g. 1% by weight, of inherent soluble fruit component and a large amount of the extraction fluid, typically pure water. The infusion syrup is formulated such that the level of inherent soluble fruit component in the infusion syrup is approximately 1% by weight; equal in concentration to the level in the decharacterized fruit. During infusion, no net infusion or extraction of inherent soluble fruit component occurs. The spent syrup exiting the infuser is a blend of inherent and non-inherent soluble components diluted by water extracted from the fruit. This spent syrup, comprising a higher relative proportion of inherent fruit component when compared to the target infusion syrup formulation, can be recovered and recycled in its entirety by concentrating to remove the excess water and adding the requisite amount of non-inherent components to adjust the formulation in line with the desired infusion syrup feed. If the syrup is formulated to comprise a higher concentration of inherent fruit component than in the extracted fruit, there will be a net infusion of the inherent fruit components into the decharacterized fruit. In this case, the spent syrup can be recycled in its entirety by concentrating to remove the excess water and adding the requisite amount of inherent fruit components (e.g., by adding juice or juice concentrate) to adjust the formulation in line with the desired infusion syrup feed. In either case, the syrup can be concentrated without the aid of enzymes to a level appropriate for subsequent formulation in infusion syrup. Thus, there is no need to

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bleed off spent syrup as a low value byproduct, since it can be concentrated and then recycled in its entirety without adversely effecting the formulation of the infused fruit product.

By contrast, in processes which simultaneously extract and infuse by soaking fruit in an infusion syrup (as previously discussed), to produce an infused product having a low inherent fruit component level only a fraction of the spent syrup generated can be recycled. In effect, the level of inherent soluble fruit component in the infused product can only be controlled by removing the requisite amount of inherent soluble fruit component in spent syrup as a low value byproduct.

The invention is therefore of a particular economic advantage since the inherent fruit component which needs to be removed from the fruit (in order to control the formulation of the infused product) is removed up front, prior to infusion, as a high value high quality fruit juice. Process costs are also significantly reduced by the more efficient handling of spent infusion syrup. Further, this feature is of particular importance for infusion of high-acid fruits, such as cranberries, which require low controlled amounts of inherent soluble fruit component to enhance sweetness and make the infused fruit product more palatable but still reminiscent of cranberry flavor.

"Decharacterized fruit" as used herein refers to whole fruit or fruit pieces that have been subjected to extraction such that at least 50% of soluble solids have been removed. "Firm fruit" as used herein are those which resist structural collapse under substantial compression and typically are extracted in prior processes with the aid of pectinase enzymes and/or high temperature to increase yield. Examples include, apples, cranberries, cherries and grapes. On the other hand, "soft fruits" are easily collapsed. Examples include raspberries, blackberry and the meat of various fruits especially tropical fruits, e.g., kiwi, guava, mango and passion. (Fruits of this type are also typically extracted in prior processes with the aid of enzymes and/or high temperatures to increase yield.) It will be understood that processes of the invention may achieve advantages such as improved yield, quality and lower cost with many fruits. All percentages herein are by weight unless otherwise indicated or apparent.

In a first aspect, the invention features a countercurrent apparatus for use with fruit solids that has an elongate housing in the form of a trough or tube with an inlet at or adjacent one end and an outlet at or adjacent the other end. A screw conveyor with a substantially helical flight is disposed within the housing. The flight is rotatable about its longitudinal axis for moving fruit solids which have been introduced into the housing through the inlet from the one end to the other end of the housing. Means are provided for introducing liquid into the other end of the housing in a manner such that introduced liquid will flow along the housing to the one end thereof and counter current to the fruit solids. A drive means causes the screw conveyor to rotate for providing a net forward motion of the fruit solids from the one end to the other end. Means are also provided for withdrawing liquid from the housing at a point at or adjacent the one end thereof. The apparatus is characterized by a screw conveyor that includes a series of narrow longitudinal members parallel to the conveyor axis positioned between adjacent flights.

Various embodiments include the following features. The longitudinal members are radially positioned from

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the periphery, preferably, about 10% to 70% the distance from the periphery to the axis of the flights. There are 1 to 12 longitudinal members per square foot of flight area. The longitudinal members are positioned in a circumferential pattern about the axis of the flights. Two sets of members are provided at different radii from the axis. One set of longitudinal members are provided at a radius of about 25% the distance from the periphery of said flight to the axis and a second set of longitudinal members at a radius about 50% the distance from the periphery to the axis of said flight. The longitudinal members may be relatively rigid wires or rods with a diameter in the range of 0.032 to 0.500 inches. The direction of rotation of the screw conveyor is intermittently reversed.

In another aspect, the invention features extracting juice from fruit by providing raw fruit in a dimensionally stable form, penetrating the skin of the fruit to expose the inside of the fruit, unprotected by skin, and treating the fruit with a liquid in a countercurrent apparatus by advancing the fruit along a path while flowing the liquid countercurrently to the advancing fruit and uniformly, continuously tumbling the fruit while treating the fruit with the liquid and maintaining a process temperature of about 75° F. or less during extraction, and collecting the extract from the fruit.

In another aspect, the invention features treating fruit by providing raw fruit, penetrating the fruit to expose the inside of the fruit, unprotected by the skin, countercurrently extracting juice from the fruit with an extraction liquid to provide extracted fruit, collecting the extract from the fruit, collecting the extracted fruit, subjecting the extracted fruit to countercurrent infusion with an infusion liquid to provide an infused fruit, and collecting the infused fruit.

In another aspect, the invention features a method for processing fruit by providing raw fruit, penetrating the fruit to expose the inside of the fruit, unprotected by the skin, extracting the fruit with an extraction liquid to provide decharacterized fruit having a desired level of inherent soluble fruit component, collecting the extract from the fruit, collecting the decharacterized fruit, formulating an infusion liquid having inherent soluble fruit component at a level equal to or greater than the decharacterized fruit, infusing the decharacterized fruit with the infusion liquid without net extraction of the inherent soluble fruit component from the decharacterized fruit, collecting the spent infusion liquid after infusion, concentrating the spent liquid, recycling the concentrated spent liquid in its entirety for subsequent infusion, and collecting the infused fruit.

The features of these aspects may be combined. In addition, various embodiments may include one or more of the following features. The raw fruit is frozen prior to extraction. The residence time of fruit for extraction is greater than about 90 minutes, such as about 120 to 150 minutes. The extraction liquid is substantially free of pectinase enzymes, e.g. the extraction liquid is water. Uniformly tumbling is achieved between the flights of a screw conveyor by passing narrow longitudinal members positioned parallel to the axis of the screw through the fruit. A temperature of about 100° to 130° F. is maintained during the infusion step. The residence time of the fruit is about 120 to 300 minutes during the infusion. The fruit is cranberry. The method includes concentrating the spent liquid by removing excess water, reformulating the infusion liquid by adding a desired amount of inherent and/or non-inherent

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soluble components to concentrated, spent liquid, and recycling the reformulated liquid in its entirety for subsequent infusion. The infusion liquid is selected from fruit juice, fruit juice concentrate, corn syrup, sugar-water solutions, artificial sweeteners or any combination of the above, and may be fortified with flavorings, vitamins, and/or minerals. The infusion liquid has 60 to 80 brix. The decharacterized fruit has been extracted of about 94 to 98% of soluble solids. The decharacterized fruit is infused to about 40 to 55 brix. The infused fruit is dried to remove excess water to a water activity of 0.5 to 0.55.

In another aspect, the invention features food products made by method aspects of the invention. The food product may be a decharacterized cranberry having removed therefrom at least about 90% of its inherent soluble solids and including therein a flavor syrup.

Embodiments may include the following. The decharacterized fruit piece has about 94 to 98% of the inherent soluble solids removed. The syrup is a fruit flavor different from the fruit piece. The food product has brix of about 40 or greater. The fruit is a cranberry. The decharacterized fruit is free from enzyme degradation and substantially maintains the structural integrity of raw fruit, being untreated by pectinase enzymes. The decharacterized fruit has been extracted of about 50% or more of its original color (total anthocyanine content measured by alcohol extraction).

Other aspects, features and advantages follow.

#### DETAILED DESCRIPTION

We first briefly describe the drawings.

##### Drawings

FIG. 1 is a side view schematic of a countercurrent extractor;

FIG. 2 is a perspective schematic of a screw conveyor;

FIG. 2a is an end-on view of the screw conveyor of FIG. 2, taken along the lines a—a;

FIG. 3 is a flow diagram of a fruit extraction/infusion process;

FIG. 4 is a perspective illustration of a dried infused fruit product;

#### EXTRACTOR/INFUSER

Referring to FIG. 1, a countercurrent apparatus 10 for use, e.g., as an extractor, includes an elongate troughshaped housing 11 with a helical screw conveyor 2 intermittently rotated by a motor means 20, connected to a shaft 4 on its longitudinal axis. Housing 11 has an inlet hopper 14 for the introduction of material to be extracted, particularly raw cranberries, and an outlet 15 at the other end of the trough housing is provided for removal of extracted fruit pieces. The hopper 14 is disposed above the lower end of the screw which is inclined slightly upwardly at angle  $\Theta$ . A charging line 17 is provided for charging extraction liquid, typically pure water, into the housing 11 and a discharge line 16 for the discharge of liquid extract, a mixture of extraction liquid and juice. The trough temperature may be controlled (e.g., by heating or cooling with a circulating water jacket (not shown) positioned about the trough) to control the process temperature. Alternatively or in addition the temperature of the fruit or extraction liquid may be preselected prior to introduction to the extractor. The screw conveyor is operated by intermittently reversing the direction of rotation of the screw. The reversal helps the relatively compacted mass of matter

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being extracted to be opened up enhancing the penetration of extracting liquid. Other details of a suitable countercurrent extractor are described in U.S. Pat. No. 4,363,264, the entire contents of which are hereby incorporated by reference. Commercially available fruit extractor units (e.g., CCE Model 275, Howden Equipment Services Pty, Ltd., Sydney, Australia) may be modified and operated with beneficial results as described further below.

Referring to FIGS. 2 and 2a, the screw conveyor 2 includes a series of vertical, helical flights 5, having wire or rod longitudinal members 8 positioned between adjacent flights and extending longitudinally generally parallel to the conveyor shaft 4 which has an axis A (corresponding to the axis of the flight). As shown particularly in FIG. 2a, the wire members 8, may be tied to slits 7 of the flights 5. Typically, the wires are positioned at least about 10 percent and preferably no more than about 70 percent the distance from the outer periphery of each flight to the axis A and equidistantly in a circumferential pattern. The wires must be stiff enough to pass through the fruit mass without excessive bending to cause the fruit to uniformly tumble along the length between the flights of the conveyor as the shaft rotates. In particular embodiments, (employing CCE Model 275), a set of wires is positioned at  $d_s$ , about 1.5 inch from the periphery for flights of 10.8 inch diameter (wires positioned about 25% of the distance from the periphery to the axis), and three wires are used of a diameter with approximately 0.06 inch. (The diameter of shaft 4 is about 2.9 inches.) An optional second set of wires 8' (FIG. 2a only) may be provided at a distance of about 3 inch from the periphery (about 50% of the distance from the periphery to the axis). In some embodiments, especially with larger flights, multiple circumferential sets of wires may be provided at various radii between the axis and periphery. In some embodiments, the wires might be positioned closer to the axis between flights near the raw fruit inlet 14 than between flights near the extracted fruit outlet 15. Positioning the wires further from the axis within the specified range has a greater tumbling effect near the decharacterized fruit outlet 15 where the fruit is usually more compacted. Typically, about 1 to 12 wires per square foot of flight area are provided. Preferably, the longitudinal members are positioned equi-distantly radially and circumferentially. Preferably, longitudinal members are provided between adjacent flights for the entire length of the conveyor.

As further described in the Examples below, it has been found that, by employing longitudinally extending members, such as wires 8, improved efficiency in extraction of juices from fruit may be achieved, even in the case of firm berry fruits such as cranberries. In addition, it has been found that a countercurrent apparatus, as described, can be used for the infusion of fruit decharacterized by extraction to provide new food products. In this case, extracted, decharacterized fruit is placed in the inlet hopper 14 and an infusion liquid carrying a desired flavor is introduced through charging line 17. The infused fruit product exits outlet spout 15. The use of members 8 also improves efficiency of the infusion.

Preferred and typical parameters for operation of a countercurrent apparatus with the improved conveyor for extraction of cranberries are given in Table I below and parameters for infusion of decharacterized cranberries with an improved conveyor are given in Table II



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below. "Extract level" and "infusion liquid level" refers to the depth of these liquids compared to the screw flight nearest the discharge line 16. The "process temperature" is the temperature of the liquid in the trough. (The temperature of liquid in the trough is typically measured about one half the length of the trough from the fruit inlet and is generally the highest temperature along the trough in cases where unheated fruit and liquid are introduced at either end.) The screw rotation is the speed at which the screw rotates in any direction (e.g. during intermittent rotation). The water/fruit and infusion syrup/fruit feed rate ratio are the weight ratios of the rates at which these components are fed to the trough. For operation with a preferred countercurrent apparatus, CCE model 275 modified as discussed, the berry weight in the trough and berry feed rate are also given. (It will be understood that desired feed rates for liquid and fruit for an infusion or extraction apparatus of any size may be calculated from the tables below, knowing the trough capacity of the particular unit used and the range of feed ratios specified below.)

TABLE I

Process Variable	Range	Typically
inclined angle $\theta$ (degrees)	2 to 6	4
process temperature (deg. F.)	45 to 75	65
fruit residence time (minutes)	30 to 180	135
screw rotation (rpm)	1 to 4	2
water/fruit feed rate ratio (weight ratio)	1:1 to 4:1	2.5:1
extract level (% of flight diameter at discharge)	50 to 70%	60%
<u>For CCE Model 275</u>		
Berry weight in Trough (lbs)	70-80	75
Berry feed rate (lbs/hr)	23-160	33

For infusion of cranberries, the countercurrent apparatus is preferably operated with the parameters in Table II below.

TABLE II

Process Variable	Range	Typically
inclined angle $\theta$ (degrees)	2 to 6	4
process temperature (°F.)	100 to 130	110
fruit residence time (minutes)	120 to 300	240
screw rotation (rpm)	1 to 4	2
infusion liquid/fruit feed rate ratio (weight ratio)	2:1 to 6:1	3:1
infusion liquid level (% of flight diameter at discharge)	50 to 70%	60%
<u>For CCE Model 275</u>		
dicharacterized fruit weight in Trough (lbs.)	65-75	70
decharacterized fruit feed rate (lbs/hr.)	13-38	17.5

### Process

Referring now to FIG. 3, a flow diagram is shown of a preferred process employing extraction followed by infusion and preferably using countercurrent apparatus as described above with respect to FIGS. 1-2a. (It will be understood that other extractors and infusers may be used in the process.) The process will be described for use with cranberries, although it may be adapted for use with other fruit, especially firm fruit.

Whole raw fruit which has been bulk frozen is provided to a cleaning stage 40 to remove debris such as

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twigs, leaves, soil, etc. and then conveyed to a sorting stage 42 which sorts fruit of a selected size, within a selected deviation, and removes rotten or damaged fruit. The freezing of the fruit prior to further processing is believed to be an important aspect of the invention, in that, upon rethawing, the fruit is structurally more susceptible to juice extraction. Again, the deleterious effect on juice quality associated with high temperature treatment (or the use of enzymes) is avoided. The frozen fruit is in the raw state, without having been boiled or otherwise cooked prior to processing. The frozen fruit (e.g., initially at about 25° F.) thaws naturally upon exposure to the flume water (e.g., about 55° F.) and the extraction trough (e.g., about 65° F.) without any substantial heating. As discussed above, generally, exposure to heat is avoided especially prior to and during extraction, so that the fruit is not exposed to average process temperatures above about 75° F.

Control over the average size and standard deviation of the raw fruit is also believed an important attribute of the present process whereas a uniformly sized infused product ultimately results. In the case of cranberries, preferably the sorted berries are 16 to 20 millimeters (mm) in diameter with a standard deviation of about 1 mm. The size-selected fruit is later passed to a dicer stage 44 (Model RG-6, A. B. Hallde Maskiner, Kista, Sweden) which slices the berries to expose the inner pulp of the fruit unprotected by the skin. The whole cranberries are preferably cut in half to provide slices between 8 to 10 millimeters in width, although other skin penetrating treatments such as scarifying may also be used.

The sliced fruit is transported by means of a flume to a separation stage 46, including a vibrating screen separation apparatus (Model LS24S444, Sweco, Inc., Florence, Ky.) which separates the sliced fruit from the flume water, recycling water back to the flume, and removes seeds at a seed collection stage 48. The sliced fruit is then provided to the solid input 51 of an extractor stage 50 which employs a countercurrent extractor which may be as previously described with respect to FIGS. 1-2a and operated within the limits of Table I. The liquid input 53 to the extractor is the extraction liquid, typically pure water without added enzyme, from a supply 52. The liquid output 54 of the extractor stage is an enzyme-free, high-quality extract mixture of extraction liquid and fruit juice which exhibits desirable qualities such as low tannin content. The extractor, preferably operating at low temperatures, but at high efficiency, avoids the detrimental effects on juice quality normally associated with higher temperature extraction, such as reduced shelf-life characteristics, burnt notes in the juice flavor and higher tannin levels. The raw juice extract from the extractor stage liquid output 54 is further treated, first in a separation stage 56, using a vibrating screen separator (Model LS24S444, Sweco, Inc., Florence, Ky.) which collects in collection stage 66 any remaining seeds and solids. The juice extract is further treated in a depectinization stage 58 in which pectinase enzyme is provided from a supply 60 and mixed with the juice extract. The enzyme, in small amounts (between about 0.01 and 0.1 percent) clears the juice extract of pectin in preparation for a filtration stage 62. Whereas the juice has already been extracted from the fruit, the enzyme plays no substantial role in the overall extraction process and thereby only small amounts of the enzyme, known to be an expensive process ingredient, need be used. Filtration at stage 62 is



achieved by means of a microfilter of 0.1–0.5 micron pore size. The filtered juice extract is further treated at a reverse osmosis stage 64, (Model BRO, Paterson Candy, Inc.) where the juice extract is passed through a membrane system under pressure to concentrate the final juice product, which is collected at stage 65 as is the excess water at stage 68. Typically, the final juice product is of about 18 brix. The cranberry juices produced by the process typically have a tannin content less than about 1900 mg/L, e.g. about 1700 mg/L (measured at 7.5 brix).

Decharacterized cranberry pieces, exiting the solid output 71 of extraction stage 50, are typically characterized by the removal of about 96 percent of the soluble solids and about 80 to 96 percent of the color. At higher temperatures, for example, at 85° to 105° F. virtually all of the color can be removed from the decharacterized fruit, if desired. Extraction time can be extended to achieve the same end. Decharacterized fruit lacking all of its original color may be advantageous for producing infused fruit products that are to take on a color other than that of the original fruit. Similarly, for producing an infused product that is characteristic, in appearance, of a cranberry, an amount of the color suggestive of the cranberry is maintained in the decharacterized fruit.

The decharacterized fruit is supplied to an infusion stage 72 including a countercurrent apparatus similar to that used at the extraction stage 50 and as discussed with respect to FIGS. 1–2a, operated in the ranges given in Table II. Liquid input at the infusion stage 72 is the desired infusion liquid such as sugar-water (e.g., fructose) solution, high fructose corn syrup, white grape juice, strawberry juice, raspberry juice, blueberry juice, apple juice and their concentrates. These infusion liquids may include flavoring, e.g., spices such as cinnamon and may be fortified with vitamins, e.g. ascorbic acid, and/or minerals, e.g. iron. The infusion liquid typically has a sugar level of about 72 brix and is provided from a continuous process loop which mixes the spent infusion liquid from the liquid output 74 from infusion stage 72 with syrup from a supply 76 which is then treated in a vibrating screen separator 78 (Model LS24S444, Sweco, Inc., Florence, Ky.) to remove and collect seeds and fines at a collection state 80. The spent infusion mixture is then concentrated at concentration stage 82 including a water collection stage 84 and finally, the liquid is treated at a blend stage 86 which may include input from an infusion sugar supply 88, before being recycled to the liquid input 90 of infuser 72 as the infusion liquid. As discussed above, the infusion liquid can be formulated to include a desired amount of natural or inherent soluble fruit component, equal to or greater than the amount present in the decharacterized fruit so that no net extraction of inherent soluble fruit component into the infusion media occurs during infusion. The infused fruit product has the desired level of inherent soluble fruit component and the spent infusion liquid is concentrated and recycled in its entirety.

The infused fruit product exiting the infusion stage at the solid output 92 is passed to a screening stage 94 at which the infused fruit product is separated from excess infusion liquid coating the solid product, which is collected at collection stage 96. The excess syrup may be provided to syrup supply 76 for recycling to the infuser 72. The infused fruit product is then provided to a dryer stage 98 which passes forced air through the infused fruit product to remove water at stage 100. Drying temperature is typically in the range of about 180° to 200° F. for about 120 minutes using a conventional forced air fruit dryer. The dried, infused fruit product is next passed to an oiler stage 102 which includes an oil supply 104 from which vegetable oil or the like is applied to the fruit product to enhance flowability. A screen separator (Model LS24S444, Sweco, Inc., Florence, Ky.) 106 with a stage 108 is used for collection of any fines and waste. The final dried infused product, maintaining substantial physical integrity of the original fruit, is collected in a collection stage 110 from which it may be bulk packaged. The dried product preferably has a sugar level of about 88 brix.

Referring to FIG. 4, a dried infused cranberry fruit product according to the invention is illustrated. The fruit product maintains substantial structural integrity of the original cranberry including the skin 114 and typically a portion of the original color of the cranberry. The flavor of the fruit product however is that of the infusion syrup which may be of many varieties including a controlled amount of flavor of the original fruit. A coating may be applied which also contributes to flavor and/or nutrient value.

The invention will be further described by way of the following examples.

#### EXAMPLE 1

The process described in FIG. 3 can be operated using raw frozen cranberries as the fruit input. In the extraction stage (referring as well to Table I) the process temperature is about 65° F., with a residence time of about 135 min., a screw rotation of 2 rpm, a water/berry weight ratio of 2.5:1 and extraction liquid (water) level of 60%. The extraction stage produces a decharacterized fruit with 0.3% inherent soluble fruit component. The infusion stage (referring as well to Table II) can employ an aqueous blend of sucrose (68.0%) and cranberry fruit components (4.0%) as the infusion syrup and a countercurrent apparatus identical to that in the extraction stage, operated at a temperature of about 110° F., residence time of about 180 min., screw rotation of about 2 rpm, infusion liquid to berry weight ratio of about 4:1. The spent infusion syrup can then be collected to be concentrated and reformulated as discussed herein. Target inputs and outputs from the various stages are summarized in Table III, below. All calculations are normalized to 8 lbs. of fruit soluble solids per 100 lbs. of cranberries.

TABLE III

PROCESS STAGE (FIG. 3)	MATERIAL	AMOUNT	CONCENTRATION (WATER PHASE)
40/42	FROZEN SORTED CRANBERRIES	100.0 LBS	8 brix
44	FLUME RECYCLE (WATER)	900.0 LBS	
48	CRANBERRY SEEDS	0.3 LBS	
51	SLICED CRANBERRIES	99.7 LBS	
53	WATER	250.0 LBS	
54/56	JUICE EXTRACT/WATER	257.7 LBS	3 brix

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TABLE III-continued

PROCESS STAGE (FIG. 3)	MATERIAL	AMOUNT	CONCENTRATION (WATER PHASE)
60	ENZYME	0.1 LBS	
65	CRANBERRY JUICE/WATER	43.0 LBS	18 brix
66	TRASH (SEEDS/FINES)	0.1 LBS	
68	WATER	214.7 LBS	
71	EXTRACTED DECHARACTERIZED SLICES	92.0 LBS	0.3 brix
74	SPENT SYRUP	256.0 LBS	55 brix
80	TRASH (SEEDS/FINES)	0.1 LBS	
84	WATER	37.9 LBS	
88	INFUSION SUGAR	61.0 LBS	
90	INFUSION SYRUP	284.0 LBS	72 brix
92/94	INFUSED FRUIT PIECES	120.0 LBS	55 brix
96	EXCESS SYRUP	5.0 LBS	55 brix
100	WATER	41.6 LBS	
104	OIL	0.1 LBS	
108	FINES	17.5 LBS	
110	DRIED INFUSED FRUIT SLICES	56.0 LBS	88 brix

The cranberry juice product provided by the process at stage 65 typically has a tannin content less than about 1900 mg/L (at 7.5 brix), and has no noticeable off-flavors associated with heat abuse. As the table indicates, the process is highly efficient for the production of cranberry juice with 43 lbs. of juice (at 18 brix) being produced from 100 pounds of cranberries. This corresponds to 96% recovery on a weight basis (FSP, fruit soluble solid pounds, i.e., percent fruit soluble solid recovery based on weight of fruit soluble solid in raw fruit compared to that recovered in the extract). In addition, the process provided a new fruit product in the way of infused cranberry slices having the sweetened flavor of the infusion syrup.

## EXAMPLE 2

The efficiency of juice recovery employing an improved extractor was illustrated by a series of comparative experiments (experiments 1 to 6) in which process parameters for extraction were varied, as summarized in Table IV below.

TABLE IV

Process parameter	Experiment					
	1	2	3	4	5	6
Unit Size	pilot	pilot	pilot	pilot	pilot	commercial
Enzymes in Extraction Liquid	Yes	No	No	No	No	No
Improved Extractor (FIGS. 1-2a)	No	No	Yes	Yes	Yes	Yes
Residence Time (min)	90	90	90	135	160	135
Extraction Temperature (°F.)	85-115	85-115	85-115	85-115	69-75	65
Efficiency % FSP recovery	75	67	84	96	96	96
Relative Tannin Content mg/L	2146	1950	2381	2292	1734	1273

In Experiment 1, a pilot sized extractor unit (nominal capacity=30 kilograms per hour) was used to extract juice from cranberries, employing in the extraction liquid enzymes effective in pectin breakdown (about 0.07-0.15 lbs./100 lbs. feed). The extractor was of a commercially available type (CCE Model 275, Howden Equipment Services Pty, Sydney, Australia). The efficiency of extraction was approximately 75% of avail-

able FSP with a relatively high (2146 mg/L, measured at 7.5° brix) tannin content.

In Experiment 2, similar process conditions were employed, with the exception that no enzyme was introduced to the extraction liquid. The efficiency of extraction dropped to about 67% of available FSP.

In Experiment 3, the extractor unit was modified as described with respect to FIGS. 1-2a; a series of longitudinally extending wires were provided between adjacent flights of the extractor screw. Surprisingly, by employing the improved countercurrent unit, extraction efficiency increased to about 84% of available FSP recovery without the use of enzymes, representing a significant improvement over operation of the conventional extractor (even with the use of enzymes).

In Experiment 4, the improved countercurrent apparatus was operated with extended residence time (135 minutes) compared to Experiment 3 (90 minutes). Under these conditions, extraction efficiency increased to about 96% of available FSP recovery.

In Experiment 5, the extraction temperature was

reduced to about 69°-75° F., compared to about 85° to 115° F. used in Experiments 1 to 4 (with the residence time marginally increased). Surprisingly, the extraction efficiency remained at about 96% of available FSP recovery and the resulting juice product was of improved quality over that of experiments 1 to 4, in that the juice exhibited significantly lower tannin levels.

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In Experiment 6, the extraction efficiency of a much larger commercial scale extraction unit (CCE model 500, nominal capacity=500 kilograms per hour) was investigated and the results compared to that obtained with the smaller pilot scale unit used in the previous experiments. The unit employed an extractor screw modified to include longitudinally extending wires between adjacent flights and was operated at an extraction temperature of 65° F., with residence times of about 135 minutes. The extraction efficiency was similar to that obtained in the smaller unit.

Other embodiments are within the following claims. We claim:

1. A method for efficiently extracting from fruit a juice that has not been exposed to high temperatures, comprising:

providing raw fruit in a dimensionally stable form, penetrating the skin of said fruit to expose the inside of said fruit, unprotected by skin, treating said fruit with an extraction liquid in a countercurrent apparatus by advancing said fruit along a path while flowing said liquid countercurrently to said advancing fruit and uniformly, continuously tumbling said fruit while treating said fruit with said liquid, maintaining a process temperature of about 75° F. or less during said extracting and, collecting said liquid extracted from said fruit to provide said juice that has not been exposed to high temperatures.

2. The method of claim 1 wherein the residence time of said fruit during said extracting in said countercurrent apparatus is greater than about 90 minutes.

3. The method of claim 2 wherein the residence time is about 120 to 150 minutes.

4. The method of claim 3 further comprising freezing said raw fruit prior to said providing step.

5. The method of claim 4 wherein said extraction liquid is water substantially free of pectinase enzymes.

6. The method of claim 1 or 5 wherein said uniformly tumbling includes tumbling between flights of a screw conveyor by passing narrow longitudinal members positioned parallel to the axis of said screw conveyor through said fruit.

7. The method of claim 6 wherein said fruit is cranberry.

8. A method for processing fruit, comprising: providing raw fruit, penetrating said fruit to expose the inside of said fruit, unprotected by the skin,

countercurrently extracting said fruit with an extraction liquid while maintaining conditions, including a low temperature, that provide extracted fruit with substantially the structural integrity of the raw fruit, and a fruit extract that has not been exposed to high temperatures,

collecting the extract from said fruit, collecting the extracted fruit, and countercurrently infusing said extracted fruit with an infusion liquid while maintaining conditions that provide an infused fruit with substantially the structural integrity of the raw fruit, and collecting said infused fruit.

9. The method of claim 8 comprising freezing said raw fruit prior to said providing step.

10. The method of claim 8 further comprising collecting spent infusion liquid after said countercurrent infusion, concentrating said spent liquid and recycling said

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concentrated liquid in its entirety for subsequent infusion.

11. The method of claim 10 comprising: extracting said fruit to provide a decharacterized fruit having a selected level of inherent soluble fruit component, and

formulating said infusion liquid to have a level of inherent soluble fruit component substantially equal to or greater than said level in said decharacterized fruit

12. The method of claim 8 wherein said decharacterized fruit has been extracted of about 94 to 98% of soluble solids.

13. The method of claim 8 wherein said infusion liquid includes a liquid selected from fruit juice or fruit juice concentrate, corn syrup, sugar-water solutions, and artificial sweeteners or combination thereof.

14. The method of claim 13 wherein the infusion liquid is fortified with a material selected from the group consisting of vitamins, flavorings, minerals, and combinations thereof.

15. The method of claim 8 wherein said infusion fruit to about 60 to 80 brix.

16. The method of claim 8 comprising infusing said fruit to about 40 to 55 brix.

17. The method of claim 16 further comprising drying said infused fruit to remove water.

18. The method of claim 17 comprising drying said infused fruit to about 40 brix or greater.

19. The method of claim 17 comprising drying said infused fruit to a water activity of about 0.5 to 0.55.

20. The method of claim 8 wherein the extraction liquid is water substantially free of pectinase enzymes.

21. The method of claim 20 comprising extracting said fruit by advancing said fruit and flowing an extracting liquid countercurrently to said advancing fruit, while continuously uniformly tumbling said fruit between the flights of a screw conveyor by passing narrow longitudinal members parallel to the axis of said conveyor through said fruit.

22. The method of claim 21 further comprising infusing said decharacterized fruit by advancing said fruit and flowing an infusing liquid countercurrently to said advancing fruit, while continuously uniformly tumbling said fruit between the flights of a screw conveyor by passing narrow longitudinal members parallel to the axis of said conveyor through said fruit.

23. The method of claim 22 further comprising maintaining the temperature at about 75° F. or less during said extracting step.

24. The method of claim 23 comprising maintaining a residence time of said fruit of greater than about 90 minutes during said extraction.

25. The method of claim 24 wherein the residence time of said fruit is about 120 to 150 minutes.

26. The method of claim 25 comprising maintaining a process temperature of about 100° to 130° F. during said infusing.

27. The method of claim 26 comprising maintaining a residence time of said fruit of about 120 to 300 minutes during said infusing.

28. The method of any one of claims 8, 20 or 23 wherein said fruit is cranberry.

29. A method for processing fruit, comprising: providing raw fruit, penetrating said fruit to expose the inside of said fruit, unprotected by the skin,

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extracting said fruit with an extraction liquid to provide decharacterized fruit having a desired level of inherent soluble fruit component,  
 collecting the extract from said fruit,  
 collecting the decharacterized fruit,  
 formulating an infusion liquid having inherent soluble fruit component at a level equal to or greater than said decharacterized fruit,  
 infusing said decharacterized fruit with said infusion liquid without net extraction of said inherent soluble fruit component from said decharacterized fruit,  
 collecting a spent infusion liquid after said infusing, concentrating said spent liquid,  
 recycling said concentrated spent infusion liquid for subsequent infusion, and  
 collecting said infused fruit.

30. The method of claim 29 including reformulating said infusion liquid by the addition of non-inherent soluble component to said concentrated spent syrup.

31. The method of claim 30 including reformulating said infusion liquid by the addition of inherent soluble fruit component to said concentrated spent liquid.

32. The method of claim 31 wherein said infusing includes countercurrently infusing.

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33. The method of claim 32 wherein said extraction liquid is water-free of pectinase enzymes.

34. The method of claim 29 or 33 comprising freezing said raw fruit prior to said providing step.

35. The method of claim 34 comprising maintaining a process temperature of about 75° F. or less during said extracting step.

36. The method of any one of claims 1, 5, 7, 23, 29 or 35 wherein said fruit is cranberry and said extract has a tannin content of less than about 1900 mg/L measured at 7.5 brix.

37. A raw cranberry fruit food product, comprising: a decharacterized cranberry fruit piece having removed therefrom at least about 90% of its inherent soluble solids and including therein a flavor liquid, said product having a brix of about 40 or greater.

38. The food product of claim 37 wherein about 94 to 98% of the soluble solids have been removed.

39. The food product of claim 37 wherein the syrup is a fruit flavor different from the fruit piece.

40. The food product of claim 37 wherein said decharacterized fruit is free from added enzyme degradation, substantially maintaining the structural integrity of the raw fruit, being untreated by pectinase enzymes.

41. The food products of claim 37 wherein said decharacterized fruit has been extracted of about 50% or more of its original color.

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UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION

PATENT NO. : 5,320,861

DATED : Jun. 14, 1994

INVENTOR(S) : Harold L. Mantius et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 31, delete "non", insert therefor --nor--.

Column 2, line 34, delete "C" in the word concentrated,  
insert therefor lower case --c--.

Column 14, claim 15, delete "fruit to about", insert  
therefor --liquid has--.

Signed and Sealed this

Tenth Day of September, 1996

Attest:



BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks



LEXSEE

**PALOMAR MEDICAL TECHNOLOGIES, INC. and THE GENERAL HOSPITAL  
CORPORATION v. CUTERA, INC.**

**CIVIL ACTION NO. 02-10258-RWZ**

**UNITED STATES DISTRICT COURT FOR THE DISTRICT OF  
MASSACHUSETTS**

**2005 U.S. Dist. LEXIS 32117**

**December 12, 2005, Decided**

**PRIOR HISTORY:** [Palomar Med. Techs., Inc. v. Cutera, Inc., 2005 U.S. Dist. LEXIS 2612 \(D. Mass., Jan. 20, 2005\)](#)

**CASE SUMMARY:**

**PROCEDURAL POSTURE:** Defendant seller filed a motion for summary judgment on plaintiff owners' patent infringement action on grounds of invalidity and non-infringement.

**OVERVIEW:** The owners alleged that the seller of laser hair removal devices infringed on patents for hair removal using optical pulses. The court denied the seller's motion for summary judgment on invalidity grounds because the prior art references that instructed removal of hair by destroying the surrounding skin did not anticipate claims that taught the simultaneous removal of a plurality of hairs from a skin region. The court denied the seller judgment on direct infringement and inducement of infringement claims. The court found that the notes of the prototype designer, a video of the devices being used, and the seller's instruction manuals raised material fact issues as to whether pressure sufficient to compress the skin was applied to its devices and whether the seller intended customers to apply pressure, thereby inducing infringement. The seller could not read its own limitations into a claim concerning irradiation of skin touching an applicator and then argue that its devices were not encompassed by them. The court held that triable fact issues existed as to whether the seller's devices prevented skin damage and had a convex lens that tended to move radiation to one point.

**OUTCOME:** The court denied the motion.

**CORE TERMS:** skin, applicator, hair, removal, radiation, region, optical, infringement, summary judgment, lens, handpiece, irradiated, footplate, simultaneous, plurality, laser, non-infringement, invalidity, deposition, compress, surface, epidermis, discovery, follicles, compression, epidermal, targeted, touching, convex, teach

**COUNSEL:** [\*1] For Palomar Medical Technologies, Inc., Plaintiff: Daniel M. Esrick, Katie Marie Saxton, Merriann M. Panarella, Vinita Ferrera, Wayne L. Stoner, Wilmer Hale, Boston, MA; Michael A. Oblon, Wilmer Cutler Pickering Hale and DOIT LLP, Washington, DC.; Steve Shin, Hale and Dorr LLP, New York, NY.

For The General Hospital Corporation, Plaintiff: Daniel M. Esrick, Katie Marie Saxton, Merriann M. Panarella, Vinita Ferrera, Wilmer Hale, Boston, MA; Michael A. Oblon, Wilmer Cutler Pickering Hale and DOIT LLP, Washington, DC; Steve Shin, Hale and Dorr LLP, New York, NY.

For Cutera, Inc., Defendant: James L. Messenger, Patrick J. O'Toole, Jr., Weil, Gotshal & Manges, Boston, MA; Jonathan A. Marshall, Timothy E. DeMasi, Weil, Gotshal & Manges LLP, New York, NY.

For Altus Medical, Inc, Counter Claimant: Patrick J. O'Toole, Jr., Weil, Gotshal & Manges, Boston, MA.



For Palomar Medical Technologies, Inc., Counter Defendant: Katie Marie Saxton, Vinita Ferrera, Wayne L. Stoner, Wilmer Hale, Boston, MA; Michael A. Oblon, Wilmer Cutler Pickering Hale and DOIT LLP, Washington, DC.; Steve Shin, Hale and Dorr LLP, New York, NY.

For The General Hospital Corporation, Counter Defendant: [\*2] Michael A. Oblon, Michael A. Oblon, Wilmer Cutler Pickering Hale and DOIT LLP, Washington, DC; Steve Shin, Hale and Dorr LLP, New York, NY; Vinita Ferrera, Boston, MA.

**JUDGES:** RYA W. ZOBEL, UNITED STATES DISTRICT JUDGE.

**OPINIONBY:** RYA W. ZOBEL

**OPINION:**

MEMORANDUM OF DECISION AND ORDER

ZOBEL, D.J.

Plaintiffs Palomar Medical Technologies, Inc. and the General Hospital Corporation are the owners of [United States Patent No. 5,735,844](#) ("the [844 patent](#)"), "Hair Removal Using Optical Pulses." They allege that defendant Cutera, Inc., formerly known as Altus Medical, Inc., produces and sells laser hair removal devices -- known as "CoolGlide" -- that infringe claims 12, 27, and 32 of the [844 patent](#). Following a Markman hearing, the Court issued an order construing certain disputed terms. (See Feb. 24, 2004 Order). Cutera now moves for summary judgment on all three asserted claims, on grounds of invalidity and non-infringement.

I. Invalidity

Cutera first argues that asserted claims 12, 27, and 32 are invalid because they were anticipated by prior art. Because patents are presumed valid, see [35 U.S.C. § 282](#), Cutera must prove invalidity by clear and convincing [\*3] evidence, see [Richardson-Vicks, Inc. v. Upjohn Co.](#), 122 F.3d 1476, 1480 (Fed. Cir. 1997). Summary judgment on grounds of anticipation, which is a question of fact, is appropriate only if there is no dispute as to any material fact, or if there is no reasonable basis upon which the non-movant may prevail, even if all inferences are drawn in its favor. See [Scripps Clinic & Research Found. v. Genentech, Inc.](#), 927 F.2d 1565, 1576 (Fed. Cir. 1991). An asserted claim is invalid due to anticipation only if all elements and limitations of the claim are found within a single prior art reference. *Id.* There can be no difference between the claimed invention and the reference disclosure, as viewed by "a person of ordinary skill in the field of the invention." *Id.*

Cutera asserts that claims 27 and 32 were anticipated by a 1967 journal article in *Laboratory Investigation*, by James G. Kuhns and others ("Kuhns reference"). Both claims contain as an element "[a] method for the simultaneous removal of a plurality of hairs from a skin region," which, under the Court's claim construction, means a method for removing more than one hair at the same time from [\*4] an area of skin. (Feb. 24, 2004 Order, at 2). Cutera contends that this element is disclosed by Figure 7 of the Kuhns reference, as well as its accompanying text and legend. The Court disagrees. Figure 7 shows two hair follicles within a "lesion in moderately pigmented pig skin" caused by laser radiation. (Garretson Decl., Ex. 5, at WG 5280). Specifically, the image shows an "ablated epidermis, intact superficial dermis, and hair follicles, with alteration from heat on the side toward the beam." (*Id.*). In other words, the Kuhns reference instructs that hair follicles may be injured when the skin is sufficiently damaged by laser radiation to result in ablation, or severe burning, of the epidermis. Hair removal associated with severely burnt skin does not disclose removal of hair from a skin region, but rather removal of hair as well as skin. Were the Court to find that damage to hair follicles accompanied by severe burning of the skin, as disclosed in Kuhns, constituted "removal of hairs . . . from a skin region," then, as plaintiffs' expert Dr. Bass points out, "even a blowtorch would be considered to be an apparatus for simultaneous removal of hair from skin." (Saxton [\*5] Decl., Ex. 5, P 17). The Kuhns reference therefore did not anticipate claims 27 or 32, since it failed to disclose at least one element of those claims. See [Scripps Clinic & Research Found.](#), 927 F.2d at 1576 (anticipation requires that all elements and limitations be found in single prior art reference).

Cutera next contends that claims 12 and 27 were anticipated by a 1983 article authored by T. Ohshiro and Y. Maruyama ("Ohshiro reference"). This argument fails for similar reasons. Claim 12, like claims 27 and 32, describes the "simultaneous removal of a plurality of hairs from a skin region." The Ohshiro reference teaches hair removal to the extent

that it discloses the removal of naevi, or skin lesions. (Garretson Decl., Ex. M, at PAL019977). The Ohshiro reference teaches that naevi, including hairy naevi, are removed by laser radiation that (1) damages the epithelium, (2) destroys the dermo-epidermal junction (i.e., the layer between the dermis and the epidermis), and (3) allows the treating physician to "easily peel []" away the epithelium. (Id. at PAL019978). In other words, the Ohshiro reference instructs removal of hairy naevi by first damaging and then [\*6] entirely removing a layer of skin. As explained above, a prior art reference that instructs removal of hair by destroying the surrounding skin does not anticipate claims 12 or 27, which teach the removal of hair from skin.

Because neither Kuhns nor Ohshiro teaches the simultaneous removal of a plurality of hairs from a skin region, they do not anticipate the asserted claims. Cutera's motion for summary judgment on grounds of invalidity is therefore denied.

## II. Infringement

Cutera also seeks summary judgment on the basis of non-infringement. Plaintiffs have alleged both direct infringement and inducement of infringement. A patentee claiming direct infringement must "show that the accused device contains or performs each limitation of the asserted claims," either literally, or under the doctrine of equivalents. [TI Group Auto. Sys. Inc. v. VDO N. Am., LLC](#), 375 F.3d 1126, 1139-40 (Fed. Cir. 2004). To show inducement of infringement, plaintiffs must show that Cutera committed acts causing another to infringe and that it "knew or should have known [its] actions would induce actual infringements." [Manville Sales Corp. v. Paramount Sys., Inc.](#), 917 F.2d 544, 553 (Fed. Cir. 1990). [\*7] Defendants who seek a finding of non-infringement at the summary judgment stage face an uphill battle, since infringement is a question of fact, and, particularly under the doctrine of equivalents, may require "difficult factual determinations." [Leggett & Platt, Inc. v. Hickory Springs Mfg. Co.](#), 285 F.3d 1353, 1360 (Fed. Cir. 2002). The Court may grant Cutera's summary judgment motion only if there is no dispute as to any material factual issue. See [Techsearch, LLC v. Intel Corp.](#), 286 F.3d 1360, 1370-71 (Fed. Cir. 2002).

### A. Claim 12

Claim 12 of the [844 patent](#) states:

12. A method for the simultaneous removal of a plurality of hairs from a skin region . . . , the method comprising the steps of:

- (a) placing an applicator in contact with the skin surface in said skin region; and
- (b) applying optical radiation of a selected wavelength and of a selected fluence through said applicator to said skin region . . . ;

pressure being applied to the applicator during steps (a) and (b) so as to cause the applicator to deform the skin region thereunder.

In this Court's claim construction order, the term "applicator" was construed [\*8] as meaning "[a] device for applying optical radiation," and the phrase "pressure being applied to the applicator . . . so as to cause the applicator to deform the skin region thereunder" was construed as meaning "pressure being applied to the applicator so as to cause the applicator to compress the area of skin under it." (Feb. 24, 2004 Order, at 3).

Cutera seemingly concedes that the CoolGlide handpieces are "applicators" within the meaning of claim 12, but denies that pressure is applied to the handpieces. Cutera's first argument is that pressure is not applied to the CoolGlide handpieces because doing so would make little sense. Cutera points out that the [844 patent](#) calls for pressure to be applied to the applicator in order to achieve a specific purpose, i.e., "more efficient delivery of light to the follicular target regions" (Garretson Decl., Ex. A, at 6:60-66). Because applying pressure to Cutera's devices allegedly would not achieve this result, Cutera maintains that pressure is not applied to the accused devices within the meaning of claim 12.

However, claim 12 does not refer to the reasons for applying pressure to the applicator; it merely describes the application of [\*9] pressure as part of the patented method. The Court's Markman order construed claim 12 simply as specifying that a certain amount of pressure (i.e., an amount sufficient to compress the underlying skin) be applied to the applicator. (See Feb. 24, 2004 Order, at 3). The issue before the Court, therefore, is not why pressure is applied to the accused devices (or why not), but rather whether or not pressure sufficient to compress the underlying skin is applied to the accused devices. On this issue, summary judgment is inappropriate. According to Cutera, no "appreciable" compression of the skin occurs during use of the accused products, and any compression of the skin is "minimal." (Cutera Jan. 14, 2005 Mem., at 13 n.6). The chilled footplate is, Cutera maintains, never pressed into the skin, but is instead "glided over the skin." (Id. at 12). Whether compression of the underlying skin occurs during use of the Cutera devices, however, and whether that pressure results in compression that is "appreciable" or more than "minimal" are disputed questions of fact. As Palomar notes, Cutera's training and instruction materials warn users to ensure that the footplate remains in contact [\*10] with the skin, "especially over curves." (Saxton Decl., Ex. 15, at ALT 000137). Reasonable jurors could find that pressure sufficient to compress the underlying skin was required in order to maintain constant contact between the footplate and curved areas of skin. Furthermore, a video displayed at oral argument on Cutera's motion depicts through animation the application of a Cutera product; the animation shows the skin beneath the Cutera device being somewhat compressed as the footplate passes over the skin. Perhaps most significant, the record includes the notes of Michael Sasnett, the designer of a prototype of the CoolGlide products, which state that the handpiece is to be pressed upon the skin. (Saxton Decl., Ex. 22, at ALT 017390).

Cutera argues that even if the skin beneath the applicator is somehow compressed, there is no evidence in the record that such compression results from pressure being brought to bear upon the applicator, and further challenges the relevance of Sasnett's notes, which it claims reflect only early stages of product development. On a motion for summary judgment, however, the Court draws inferences in the nonmovant's favor; in doing so, it is clear that [\*11] a material issue of fact exists as to whether pressure sufficient to compress the underlying skin is applied to Cutera's CoolGlide devices. For substantially the same reasons, a factual dispute exists as to whether Cutera intends that its customers apply pressure to its devices so as to compress the skin under them and thereby induces infringement. Accordingly, summary judgment as to both direct infringement and inducement of infringement of claim 12 is denied.

#### B. Claim 27

Claim 27 of the [844 patent](#) covers an "apparatus for the simultaneous removal of a plurality of hairs from a skin region," consisting of:

An applicator which is adapted to be in pressure contact with a portion of the skin surface containing a plurality of hairs in said skin region;

a source of optical radiation . . . ; and

means for applying the optical radiation from said source to said applicator, the optical radiation being passed through the applicator to said skin region.

Cutera argues that claim 27 requires that the applicator be in pressure contact with and irradiate the same area of skin at the same time. (See, e.g., Cutera Jan. 14, 2005 Mem., at 16 (characterizing claim [\*12] 27 as describing "an area of skin that is being simultaneously contacted and irradiated")). The footplate of the Cutera handpiece is, by contrast, placed in contact with an area of skin to pre-cool that area; the handpiece is then moved so that the pre-cooled area is no longer touching the applicator, but is instead directly below a laser beam, which is projected from a recessed area of the applicator. The pre-cooled area is therefore not touching the handpiece while it is irradiated by this beam; instead, an adjacent area of skin is placed in contact with the footplate of the applicator and pre-cooled. Because the area of skin being irradiated is not in contact with the handpiece at the same time that it is being irradiated, and because the irradiation is not applied to the skin through the surface that touches the skin, Cutera maintains that its devices do not literally infringe claim 27.

Again, Cutera is attempting to read a limitation into claim 27 that does not exist. During the claim construction phase, Cutera asserted the same position, contending that claim 27 required that optical radiation be applied to the skin "through the surface of the applicator in contact with the [\*13] skin surface." (Cutera May 23, 2003 Mem., at 15-16).

The Court rejected that argument at the time and continues to do so. Claim 27 requires (1) that the applicator be placed in pressure contact with the targeted skin region; (2) that optical radiation be passed through the applicator; and (3) that the optical radiation passed through the applicator be applied to the targeted skin region. It does not, however, purport to require that all three of those elements occur simultaneously, nor, under the Court's claim construction order, does claim 27 require that optical radiation pass through the portion of the applicator whose surface is in contact with the patient's skin. Cutera does not deny that the CoolGlide handpieces are placed in contact with the targeted area of skin or that optical radiation is passed through the applicator to that same targeted area of skin; it simply argues that those two functions do not occur simultaneously and that the optical radiation does not pass through that portion of the applicator that touches the skin. Cutera cannot prevail on summary judgment simply by reading its own limitations into claim 27 and then arguing that its devices are not encompassed [\*14] by those limitations.

Moreover, even were the Court to accept for purposes of argument Cutera's assertion that claim 27 requires that the area of skin touching the applicator must simultaneously be irradiated, evidence in the record raises a triable issue of fact as to that limitation. The illustration of the accused devices in Cutera's own submissions indicate that the portion of the applicator touching the patient's skin includes not only the footplate, but also two treatment guides, that extend beyond the footplate and partially surround the area currently being irradiated. (See Cutera Jan. 14, 2005 Mem., at 16). According to plaintiffs' expert, Dr. Bass, scattering of laser radiation within the skin tissue may result in irradiation of follicles below the treatment guides. (Saxton Decl., Ex. 2 P 93). In other words, areas of skin that are in contact with the treatment guides may be irradiated at the same time that they are touching the treatment guides. Accordingly, summary judgment as to claim 27 is denied.

#### C. Claim 32

Claim 32, a method claim, requires "positioning an element" over the area of skin to be irradiated. Cutera's non-infringement argument with [\*15] respect to claim 32 is based on the Court's construction of the term "element" as "a device or component of a device for converging optical radiation." (Feb. 24, 2004 Order, at 4). Cutera begins by referring to the definition of "converge" contained in the American Heritage Dictionary, as moving "toward a common point," and then argues that light exiting the lens in its accused devices is actually diverging, rather than moving toward a common point.

It is undisputed that the accused devices contain at least one convex lens through which laser radiation passes before reaching the targeted skin region. While Cutera points to deposition testimony of Kevin Connors, its president and CEO, in which he states that the "light leaving the lens is diverging," (Garretson Decl., Ex. X, at 101:23-24), there seems to be no dispute that the lens is convex, since both Mr. Connors and Cutera's expert witness Dr. Clement agreed that the accused devices contain a lens that is thicker in the middle than at the edges. (Id. at 107:7-9; Saxton Supp. Decl., Ex. I, at 201-03). Plaintiffs argue that a convex lens is, by definition, a lens that converges optical radiation, citing the Academic [\*16] Press Dictionary of Science and Technology, which defines a "converging lens" is one where the "lens is thicker at its center than at its edge." (Saxton Supp. Decl., Ex. K, at 517). Given these dueling definitions of "converging," and drawing all inferences in favor of the nonmovants, a triable issue of fact exists as to whether the convex lens contained in Cutera's CoolGlide devices does tend to move the optical radiation toward one point.

#### D. Claims 12, 27, Deck and 32

Finally, Cutera raises a separate non-infringement argument as to all three of the asserted claims. Cutera contends that if the Court accepts for invalidity purposes plaintiffs' construction of "simultaneous removal of a plurality of hairs from a skin region" to mean removal of hair with little or no damage to the surrounding skin, it must apply the same construction to judge infringement. Further, says Cutera, Palomar has failed to present any evidence that Cutera's devices remove hair without damaging surrounding skin, and has therefore failed to raise a material issue of fact as to a limitation of the asserted claims. The record does, however, contain evidence indicating that Cutera's products remove hair while [\*17] minimizing or eliminating damage to surrounding tissue and that Cutera deliberately markets this feature of its CoolGlide products. The CoolGlide Treatment Guidelines, for example, repeatedly refer to steps to be taken by practitioners to avoid "unwanted epidermal damage," to "provide the greatest epidermal safety," and to "provide increased epidermal protection." (Saxton Decl., Ex. 15). Practitioners using Cutera's CoolGlide devices are further instructed to monitor the epidermis during treatment for "signs of damage (epidermal separation or gray coloration," and, if damage is observed, to "reduce the fluence." (Id.). The website of one of Cutera's customers describes the CoolGlide as achieving laser hair removal "without causing unwanted thermal damage to surrounding tissue," and further notes that the CoolGlide product cools the epidermis "to prevent epidermal damage." (Saxton Decl., Ex. 19). Summary judgment on that basis is therefore denied.

III. Conclusion

Accordingly, Cutera's motion for summary judgment on grounds of invalidity and non-infringement (# 142 on the Docket) is denied.

December 12, 2005

DATE

RYA W. ZOBEL

UNITED STATES DISTRICT JUDGE [\*18]

ORDER

December 12, 2005

ZOBEL, D.J.

Defendant in this patent infringement action seeks leave to take certain [Rule 30\(b\)\(6\)](#) depositions, although fact discovery has already concluded. As evidenced by the fact that defendant noticed these depositions before the close of fact discovery, it had ample opportunity to conduct the depositions, and plaintiffs repeatedly made available for deposition the witnesses whose testimony was required. See [Fed. R. Civ. P. 26\(b\)\(2\)](#). Defendant, who successfully objected to plaintiffs' attempt to depose a former Cutera employee after the close of fact discovery, see Jan. 20, 2005 Order, at 3, cannot now attempt to do the same. Defendant argues that it did not take these depositions within the time allowed by the Court's discovery schedule (which was thrice extended) because it deemed it more efficient to await resolution of certain discovery disputes before proceeding with the depositions. It cannot thus rewrite the rules. The motion (# 147 on the docket) is therefore denied.

December 12, 2005

DATE

RYA W. ZOBEL

LEXSEE

**EDWARDS SYSTEMS TECHNOLOGY, INC, Plaintiff-Appellant, v. DIGITAL  
CONTROL SYSTEMS, INC. Defendant-Cross Appellant.**

**03-1116, 03-1166, 03-1419**

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

**99 Fed. Appx. 911; 2004 U.S. App. LEXIS 9679**

**May 18, 2004, Decided**

**NOTICE:** [\*\*1] THIS DECISION WAS ISSUED AS UNPUBLISHED OR NONPRECEDENTIAL AND MAY NOT BE CITED AS PRECEDENT. PLEASE REFER TO THE RULES OF THE FEDERAL CIRCUIT COURT OF APPEALS FOR RULES GOVERNING

CITATION TO UNPUBLISHED OR NONPRECEDENTIAL OPINIONS OR ORDERS.

**DISPOSITION:** Affirmed in part, vacated in part and remanded.

**CASE SUMMARY:**

**PROCEDURAL POSTURE:** Plaintiff patentee appealed the United States District Court for the District of Oregon's grant of summary judgment of non-infringement in favor of defendant. The patent disclosed a device for measuring very low concentrations of environmental gases, such as carbon dioxide, through the use of radiation absorption. The suit involved two accused devices: the M301A device and two versions of the M310 device.

**OVERVIEW:** The appellate court first construed three limitations in claim 1: "semipermeable membrane;" "specularly reflective surface;" and "plurality of apertures arrayed along." The first limitation simply required that the particles kept out of the chamber by the semipermeable membrane were of a predetermined size such as the size of dust and smoke particles. "Predetermined size" was not limited to 0.1 micron. "Specularly-reflective surface" was a surface that reflected light as by a mirror or speculum. The third limitation meant a sample chamber with a minimum of two apertures located somewhere along the surface of the sample chamber. The M301A device could not literally infringe claim 1 because it did not have a semipermeable membrane having a thickness less than several hundreds of microns. Further, because the patent expressly distinguished the invention from devices using porous materials having a thickness greater than several hundreds of microns, the M301A device did not infringe under the doctrine of equivalents. Although the M310 devices contained the third limitation, genuine issues of material fact existed as to whether the first two limitations were met.

**OUTCOME:** The appellate court reversed the district court's claim construction to the extent it conflicted with the appellate court's construction. The appellate court affirmed the district court's grant of summary judgment of noninfringement with respect to the M301A device. The appellate court vacated the district court's grant of summary judgment of noninfringement with respect to the M310 device and remanded the issue of infringement for trial.

**CORE TERMS:** membrane, chamber, micron, specification, semipermeable, particle, patent, tube, aperture, predetermined, surface, thickness, numerical, radiation, summary judgment, filter, dust, specularly-reflective, thick, invention, thin, specular, tape, infringe, vent, plurality, noninfringement, airborne particles, filtering, arrayed

**JUDGES:** Before NEWMAN, Circuit Judge, ARCHER, Senior Circuit Judge, and PROST, Circuit Judge.

**OPINION:** [\*912] ARCHER, Senior Circuit Judge.

**OPINIONBY:** ARCHER



Edwards Systems Technology, Inc. ("Edwards") appeals the United States District Court for the District of Oregon's grant of summary judgment of non-infringement of [United States Pat. No. 5,163,332](#) ("the '332 patent"). *Edward Sys. Tech., Inc. v. Digital Control Sys., Inc.*, Civ. No. 00-1365-AS (D. Or. Sep. 24, 2002) (Order Adopting Findings and Recommendation of Magistrate Judge Ashmanskas and Granting Motion for Partial Summary Judgment). We hold that the district court erred in its claim construction. In view of the correct claim construction, we affirm-in-part and vacate-in-part the grant of summary judgment of noninfringement and remand the case for further proceedings. With respect to Digital Control, Inc.'s ("Digital Control") cross-appeal, we also vacate the district court's denial [\*\*2] of its motion for attorney fees and dismissal of its counterclaims.

# I

The '332 patent is drawn to a device for measuring very low concentrations of environmental gases, such as carbon dioxide, through the use of radiation absorption. The gas analyzer of the '332 patent has a diffusion-type chamber which permits the gas to be tested (such as air) to diffuse into and out of the sample chamber through a number of openings ("apertures") in the chamber wall by means of ambient pressure, thereby eliminating the need for a pump or similar mechanism to force gas into the sample chamber. The openings in the chamber wall are covered by a filter ("semipermeable membrane") that allows molecules of gas to diffuse into and out of the chamber while excluding small airborne particles that may interfere with the operation of the device.

The '332 patent has one independent claim and 5 dependent claims. Claim 1 recites

1. A diffusion-type gas sample chamber for transmitting radiation through gases present in the chamber only by ambient pressure diffusion through a plurality of filtering apertures formed in the chamber walls, comprising in combination:

a) an elongated hollow tube composed [\*\*3] of a gastight material and having a specularly-reflective surface on its inner walls for transmitting radiation introduced at one end of said tube to the other end of said tube by means of [\*\*913] multiple reflections from said specularly-reflective surface;

b) said tube including a plurality of filtering apertures arrayed along said tube for

improving the diffusion into and out of the space within said tube; and,

c) a sheet of a semipermeable membrane covering each of said plurality of filtering apertures, said semipermeable membrane permitting gases to diffuse through it under ambient pressure into and out of the space within said tube and preventing airborne particles larger than a predetermined size from entering said space.

'332 Patent, col. 6, ll. 1-22 (claim terms at issue emphasized). Claim 4, which is not at issue per se, recites "said predetermined size is 0.1 micron." *Id.* at col. 6, ll. 29-30.

Digital Control manufactures carbon dioxide sensors. The models at issue here are the M310 and M301A. Both devices include a sample chamber which transmits radiation from one end of the chamber to the other through a gas sample that enters the chamber [\*\*4] by diffusing through a number of filtering apertures. The M301A has two gas ports ("apertures"), diametrically opposed, near the radiation source, and a foam sleeve, approximately 5000 microns thick, covering the chamber end containing the gas ports. There are two allegedly infringing versions of the M310 device: one has a single gas port near each end, disposed on opposite sides of the chamber, and the second has two gas ports near one end (on opposite sides directly across from each other) and a single gas port on the opposite end. In the M310 models, the gas ports are covered with 3M Vent Tape 394, an adhesive-backed non-woven pressed-fiber material.

Edwards filed suit in United States District Court for the District of Oregon, alleging Digital Control infringed the '332 patent. The matter was referred to a magistrate judge for pre-trial proceedings. The magistrate judge issued a report containing a recommended claim construction and a recommended disposition of the parties' summary judgment motions. *Edwards Sys. Tech. v. Digital Control Sys., Inc.*, Civ. No. 00-1365-AS (D. Or. Mar. 12, 2002) (Findings and Recommendation). The relevant terms were construed as follows: "specularly [\*\*5] reflective surface" as "a surface that will transmit radiation down the length of the tube by means of multiple reflections from such surface," *id.* at 9; "plurality of apertures arrayed along" as requiring "a sample chamber with a minimum of two apertures located somewhere along the surface of the sample chamber," *id.* at 15; and "semipermeable membrane" as a "semipermeable membrane[] which deflects particles larger than 0.1 micron . . . [and is] a thin, soft, pliable membrane with a thickness on the order of 25 to 50 microns thick," *id.* at 19, 21. The magistrate judge found that the Vent Tape on the M310 de-

vice was not a semi-permeable membrane as required by the claim and found that the M310 device did not literally infringe the '332 patent. *Id.* at 27. Additionally, the magistrate judge concluded that the Vent Tape was not equivalent, either in purpose or performance, to the semipermeable membrane described in the patent. *Id.* at 29. Therefore, he held that the M310 device did not infringe the '332 patent under the doctrine of equivalents. *Id.* With respect to the M301A device, the magistrate judge found that it did not infringe the patent because the radiation [\*\*6] source in that device was introduced through a hole in the side of the chamber near the end of the chamber, not at one end of the tube. *Id.* at 23. The magistrate judge does not appear to have made [\*\*914] any determinations as to whether the M301A device infringed under the doctrine of equivalents. Finally, the magistrate judge recommended dismissing as moot Digital Control's motions for partial summary judgment of invalidity and enforceability. *Id.* at 30. The district court adopted the magistrate's findings and recommendations in their entirety and entered final judgment. As the prevailing party, Digital Control moved for attorney fees under 35 U.S.C. § 285. Because the magistrate judge found the case to be not "exceptional," he recommended denying this motion. The district court adopted the magistrate judge's finding and denied Digital Control's motion for attorney fees.

Edwards appeals the district court's claim construction and noninfringement findings, and Digital Control cross-appeals the dismissal of its counter-claims for invalidity and unenforceability and the district court's denial of its motion for attorney fees. We have jurisdiction pursuant to [\*\*7] 28 U.S.C. § 1295.

## II

We review the district court's grant of summary judgment without deference. *Inverness Med. Switz. GmbH v. Warner Lambert Co.*, 309 F.3d 1373, 1377 (Fed. Cir. 2002). We view the evidence in a light most favorable to the non-movant and draw all reasonable inferences in its favor. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 255, 91 L. Ed. 2d 202, 106 S. Ct. 2505 (1986). A motion for summary judgment is properly granted if there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. *Fed. R. Civ. P. 56(c)*.

An infringement analysis requires two steps: claim construction to determine the scope and meaning of the asserted claims and a comparison of the properly construed claims with the allegedly infringing device or method to determine whether the device or method embodies every limitation of the claims. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc). Claim construction is a matter of law over

which we exercise independent review. *Id.* at 1456. Whether an accused [\*\*8] device or method infringes a claim either literally or under the doctrine of equivalents is a question of fact. *Tanabe Seiyaku Co. v. United States Int'l Trade Comm'n.*, 109 F.3d 726, 731 (Fed. Cir. 1997). Thus, on appeal from a grant of summary judgment of noninfringement, we must determine whether, after resolving reasonable factual inferences in favor of the patentee, the district court correctly concluded that no reasonable jury could find infringement. *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1429 (Fed. Cir. 2000).

Whether a case is "exceptional" is a factual determination reviewed for clear error. *Phonometrics, Inc. v. Westin Hotel Co.*, 350 F.3d 1242, 1246 (Fed. Cir. 2003). If the district court applied the correct legal standard and did not clearly err in its factual findings in making its determination that a case is exceptional, we then review the court's decision whether or not to award attorneys fees under an abuse of discretion standard. *Sulzer Textil A.G. v. Picanol N.V.*, 358 F.3d 1356, slip op. at 1363 (Fed. Cir. 2004).

## A

In conducting claim construction, we first "look to the words of the claims [\*\*9] themselves, both asserted and nonasserted, to define the scope of the patented invention." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) (citing *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 620 (Fed. Cir. 1995)). "Words of ordinary usage must nonetheless be construed [\*\*915] in the context of the patent documents. Thus the court must determine how a person of experience in the field of this invention would, upon reading the patent documents, understand the words used to define the invention." *Toro Co. v. White Consol. Indus., Inc.*, 199 F.3d 1295, 1299 (Fed. Cir. 1999). "Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history." *Vitronics Corp.*, 90 F.3d at 1582. Accordingly, we must also always review the specification to determine whether the inventor has used any terms "in a manner inconsistent with their ordinary meaning, [\*\*10] " *id.*, which could result in a disavowal of claim scope, see *Teleflex, Inc. v. Ficoso N.Am. Corp.*, 299 F.3d 1313, 1324 (Fed. Cir. 2002). We must also look to the prosecution history to determine if the patentee has limited the scope of the claims by disclaiming a particular interpretation during prosecution. *Biodex Corp. v. Loredan Biomed, Inc.*, 946 F.2d 850, 862 (Fed. Cir. 1991).

The claim limitations at issue on appeal are "semipermeable membrane"; "specularly reflective surface"; and "plurality of apertures arrayed along." n1

n1 Neither party asserts the M310 device does not meet the limitation "radiation introduced at one end of said tube." Further, because we hold that the M301A device does not infringe the '332 patent as a matter of law on other grounds, we need not address that limitation in either our claim construction or our infringement analysis.

#### *Semipermeable Membrane*

Claim 1 requires the gas sample chamber include "a sheet of a semipermeable membrane covering [\*11] each of said plurality of filtering apertures, said semipermeable membrane permitting gases to diffuse through it under ambient pressure into and out of the space within said tube and preventing airborne particles larger than a predetermined size from entering said space." '332 Patent, col. 6, ll. 15-21. The district court interpreted this limitation to be "limited to [a] semipermeable membrane[] which deflects particles larger than 0.1 micron" and which "is properly described as a thin, soft pliable membrane with a thickness on the order of 25 to 50 microns thick." Finding and Recommendation, slip op. at 19, 21. Thus, the court found two numerical limitations on the semipermeable membrane: 1) the "predetermined size" of the particles prevented from entering the tube had to be 0.1 micron; and 2) the thickness of the membrane had to be "on the order of 25 to 50 microns."

We turn first to the "predetermined size" limitation. Edwards asserts the court improperly limited the claim term "predetermined size" to "particles larger than 0.1 micron," arguing that such a construction violates fundamental principles of claim construction and the doctrine of claim differentiation. Specifically, [\*12] Edwards contends that the term "predetermined size," on its face, is broader than any one numerical limitation and that the specification and prosecution history provide no basis for a specific numerical limitation. Further, Edwards argues that because dependent claim 4 recites "said predetermined size is 0.1 micron," '332 Patent, col. 6, ll. 29-30, "0.1 micron" cannot be synonymous with the "predetermined size" language of claim 1 under the doctrine of claim differentiation. Edwards also asserts that the original application, the substitute specification, and the prosecution history do not support the court's narrowing of the claim limitation.

[\*916] In response, Digital Control points out that the application as filed contained no mention of the

phrase "predetermined size" and argues that the phrase "predetermined size" in the substitute specification must find support in the original disclosure if the claim is to be valid. Digital Control contends that the only way this occurs is if the phrase is read to mean 0.1 micron, because that is all the original application supports. Digital Control also contends that in the prosecution history of the '332 patent 0.1 micron was relied on to distinguish [\*13] the semipermeable membrane from that of the prior art. Therefore, semipermeable membrane should be limited to a membrane that screens out particles greater than 0.1 micron.

When interpreting the phrase "predetermined size" of the particles screened out by the semipermeable membrane, we first look to the ordinary meaning of the words. The phrase "predetermined size" is clearly broader on its face than any one numerical limitation, whether it be 0.1 micron or any other.

We next turn to the specification -- or in this case, the specifications -- to determine whether "predetermined size" should be given another meaning. Here, the substitute specification was substituted for the original prior to examination. The phrase "predetermined size" does not appear in the original specification, and references to 0.1 micron as a numerical limitation do occur in the original specification. However, in explaining what has been "described" in the application, the detailed description does not mention a numerical limitation for the size of particles the semipermeable membrane must prevent from entering the chamber. Rather, the application simply states "dust and smoke particles are kept out of the [\*14] sample chamber by a sheet of semipermeable membrane that spans apertures that extend through the tubular wall of the sample chamber." This description demonstrates that the purpose of the membrane is to keep dust and smoke particles out of the chamber. Thus, it teaches one of ordinary skill in the art that the membrane need only be of a porosity that keeps out dust and smoke particles. As such, the application as filed does not support limiting the invention to only screening out particles greater than 0.1 micron. Accordingly, the original specification would not limit "predetermined size" to 0.1 micron. n2

n2 This is further supported by the fact that the examiner did not issue a new matter rejection in response to the filing of the substitute specification. As such, the examiner did not view the addition of the broad phrase "predetermined size" in the specification to be outside the scope of the original specification. See [TurboCare Div. of Demag Delaval Turbomachinery Corp. v. GE](#), 264 F.3d 1111, 1118 (Fed. Cir. 2001) ("The fun-

damental inquiry is whether the material added by amendment was inherently contained in the original application.") (citations omitted). This lack of a new matter rejection "carries an especially weighty presumption of correctness." [Brooktree Corp. v. Advanced Micro Devices, Inc.](#), 977 F.2d 1555, 1574-75 (Fed. Cir. 1992).

[\*\*15]

We now turn to whether the substitute specification sheds any light on the construction of the claim term "predetermined size." We conclude that the substitute specification supports a construction of the claim term that does not place a numerical limitation on the particle size. For example, the specification states

A second objective of the diffusion type gas sample chamber is to restrict access of unwanted contaminants, by size, so that they will not cause error in the measurement of the concentration of a particular gas, while at the same time permitting molecules of particular gas [sic] to freely enter and leave the sample [\*917] chamber by diffusion only, through one or more filtering apertures.

'332 patent, col. 3, ll. 28-34. The substitute specification also contains the statement from the original specification: "dust and smoke particles are kept out of the sample chamber by a sheet of semi-permeable membrane that spans apertures that extend through the tubular wall of the sample chamber." This demonstrates that the substitute specification supports a construction of "semipermeable membrane" that does not place a numerical limitation on the particle size, even [\*16] though the preferred embodiment of the invention suggests that the predetermined size be 0.1 micron. See [Electro Med. Sys. v. Cooper Life Scis., Inc.](#), 34 F.3d 1048, 1054 (Fed. Cir. 1994) (stating "claims are not to be interpreted by adding limitations appearing only in the specification" and "particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments").

Next, we look to the prosecution history of the '332 patent to determine whether "any interpretation . . . may have been disclaimed or disavowed during prosecution in order to obtain claim allowance." [Intellectual Prop. Dev., Inc. v. UA-Columbia Cablevision of Westchester, Inc.](#), 336 F.3d 1308, 1316 (Fed. Cir. 2003); see also [Inverness Med. Switz. GmbH v. Princeton Biomeditech Corp.](#), 309 F.3d 1365, 1372 (statements made during prosecution

were not a "clear and unambiguous" disclaimer of a claim scope). We hold that there was no such disclaimer or disavowal.

Two prior art references referred to in the prosecution history are relevant to this issue: Miyazaki and Fujimura. The Miyazaki reference discloses an infrared gas analyzer that comprises [\*17] a sample cell and a reference cell, both of which have the form of a spiraled cylindrical tube to achieve a long optical path. Gas is forced into the sample cell through a gas inlet and exits through a gas outlet. The Fujimura reference is an air pollution detector unit which is designed to allow a car's air conditioning system to automatically switch between inside and outside air in response to a build-up of pollutants in the car. The device is characterized by a tube with two open ends in which air is forced by the movement of the vehicle into one end of the tube and exits through the other end of the tube. The concentration of pollutants in the air is measured by beaming light from an element in the side of the tube across the diameter of the tube and back again to the detectors located on each side of the light-emitting element. The intake end of the tube is covered by a dust filter which excludes relatively large airborne particles -- it being necessary to pass smaller dust particles through so that their concentration in the air can be measured.

In the First Office Action on the Merits, the examiner rejected claim 1 over Miyazaki in view of Fujimura, explaining that Miyazaki [\*18] does not use a filter for the aperture, but Fujimura teaches a filter and it would have been obvious to use Fujimura's filter in Miyazaki's device in order to keep dust out of the sampling tube. In response, the applicant stated

Neither Miyazaki nor Fujimura teach or suggest "a sheet of semipermeable membrane" as recited in Claim 1. The dust filter 2 of Fujimura is for presenting [sic] the entry of particles much larger than 0.1 micron; otherwise it would screen out the very particles that, by scattering the light, are essential for the operation of the instrument.

While the applicant did refer to 0.1 micron as the size of particles entering the chamber, he simply explained how the "membranes" would not work the same. The filter in Fujimura needed larger particles to enter the chamber such that pollution [\*918] levels could be measured. In the claimed invention, however, particles of the size of those Fujimura was designed to let in were to be kept out, as they could affect the device's readings. Thus, the



applicant argued that the proposed Miyazaki-Fujimura combination would not work as the claimed invention was intended, because it would let in particles that were too [\*\*19] large. Nothing in the inventor's statement suggests a "clear and unambiguous disclaimer" of all membranes that do not screen out particles down to 0.1 micron in size.

Finally, Edwards argues that the doctrine of claim differentiation suggests that the term "predetermined size" cannot be synonymous with the limitation "0.1 micron" in claim 4. The doctrine of claim differentiation presumes that separate claims do not have the same scope. [Karlin Tech. Inc. v. Surgical Dynamics, Inc., 177 F.3d 968, 971-72 \(Fed. Cir. 1999\)](#). The doctrine is particularly applicable in situations in which a claim limitation stated in general terms is asserted to be limited to a numerical range in the specification and the same numerical range appears in a dependent claim. [Modine Mfg. Co. v. United States Int'l Trade Comm'n, 75 F.3d 1545, 1551 \(Fed. Cir. 1996\)](#). In our analysis of the original and substitute specifications, it is apparent that "predetermined size" in claim 1 does not mean the same thing as 0.1 micron in claim 4.

Accordingly, the claim language itself, the specifications, the prosecution history, and the doctrine of claim differentiation all support a construction [\*\*20] of the term semipermeable membrane in which "predetermined size" is not limited to 0.1 micron; rather, the limitation simply requires that the particles kept out of the chamber by the semipermeable membrane are of a predetermined size such as the size of dust and smoke particles.

As explained above, the district court also construed "semipermeable membrane" to contain an implicit thickness limitation: that it be a thin, soft pliable membrane with a thickness on the order of 25 to 50 microns.

Edwards argues that the court erred by importing the numerical range directly from the prior art discussion in the '332 patent's written disclosure because these were merely general descriptive words in the background section of the patent. Edwards further asserts that there is nothing in the remaining portion of the specification or the prosecution history which suggests such a limitation was intended by the applicant.

Digital Control counters that both the specification and the prosecution history support the district court's imposition of a thickness limitation. Specifically, Digital Control relies on the applicant's statement during the prosecution of the '332 patent that "Burough et al. [\*\*21] [a prior art reference] make no use whatsoever of any semipermeable membrane." The theory is that because the applicant explained in the specification that the membrane is to be of the order 25-50 microns and then further identified the thickness as a point of difference

between his invention and Burough et al., the applicant intended to limit the thickness of his membrane to 25-50 microns and took the position that Burough et al.'s "several hundreds of microns thick" media was not a membrane.

Again, we start with the plain meaning of the claim terms. There is no suggestion in the specifications or the prosecution history that "semipermeable membrane" has anything other than its ordinary meaning. The term "semipermeable" means "partially permeable" or "allowing passage of certain, esp. small molecules or ions but barring others." The American Heritage College Dictionary 1240 (1997). "Membrane" [\*\*19] is defined as "a thin soft pliable sheet or layer esp. of animal or vegetable origin," Webster's Third New International Dictionary 1408 (1986).

The substitute specification n3 explains that the semipermeable membrane must be "quite thin." '332 Patent, col. 2, ll. 63-64. The only mention [\*\*22] of a suggested thickness of the semipermeable membrane occurs in the patent's discussion of the prior art. There the specification is comparing the claimed invention to the Burough et al. reference. Burough et al. discloses a device for measuring gas that includes a porous tube surrounding an enclosed column of air through which infrared radiation is beamed to measure its absorption by gas in the chamber. The specification explains that the porous material in Burough et al. is "several hundreds of microns thick," and contrasts that to the relatively thin semipermeable membrane of the claimed invention, which the specification says "is on the order of 25 to 50 microns thick." '332 Patent, col. 2, ll. 27-28.

n3 The substitute specification does not depart from the original specification when discussing any "thickness" of the semipermeable membrane.

Numerical ranges in the specification cannot, without more, be imported into the claims as limitations. See [Modine Mfg. Co., 75 F.3d at 1551](#) ("Ordinarily [\*\*23] a claim element that is claimed in general descriptive words, when a numerical range appears in the specification and in other claims, is not limited to the numbers in the specification or the other claims.") Here, there is nothing "more" suggesting a particular thickness range. In fact, there is no other mention of a numerical thickness limitation contained in the patent. Rather, the specification only suggests that the semipermeable membrane be "quite thin." Of course, because the applicant has distinguished his semipermeable membrane from the several hundreds of microns thick porous material of Burough et al., the claim limitation cannot be construed to

cover a semipermeable "membrane" that is several hundreds of microns thick. The specification does not show that Edwards disavowed claim scope and limited the thickness of the membrane to a numerical range including "on the order of 25 to 50 microns." From the plain meaning of the term in view of the specification the semipermeable membrane is "thin" and has a thickness less than several hundred microns.

Nothing in the prosecution history changes this interpretation. In responding to a rejection directed at the 0.1 micron limitation [\*\*24] in view of Burrough et al., the applicant argued "Burrough et al. make no use whatsoever of any semipermeable membrane." At most, the applicant is asserting that the semipermeable material used in Burrough et al. is not a "membrane." Even interpreting the statement in this light does nothing to suggest that the applicant intended to disclaim membranes that had a thickness other than "on the order of 25 to 50 microns." Rather, the applicant is simply disclaiming calling something several hundreds of microns thick a "membrane."

Thus, we construe "semipermeable membrane" to be a "thin" or "quite thin" layer but with a thickness of less than several hundred microns and allowing the passage of airborne particles through it while preventing airborne particles larger than a predetermined size, including the size of dust and smoke particles.

#### *Specularly-Reflective Surface*

Claim 1 includes the limitation that the sample chamber include "an elongated hollow tube . . . having a specularly-reflective [\*920] surface on its inner walls for transmitting radiation introduced at one end of the tube to the other end of said tube by means of multiple reflections from said specularly-reflective surface. [\*\*25] " '332 Patent, col. 6, ll. 6-11. The district court construed "specularly-reflective surface" to be "a surface that will transmit radiation down the length of the tube by means of multiple reflections from such surface."

Digital Control argues that this construction is incorrect, asserting that the claim limitation requires a surface with a polished or mirror-like surface finish. Specifically, Digital Control points to optical dictionaries which imply such a limitation and the repeated reference in the specification that the sample chamber acts as a "light pipe." Edwards contends that "specularly-reflective" does not require a mirror-like smoothness on the surface. In fact, Edwards concedes that if "mirror-like" describes the behavior of light incident on the surface, "there may be no quarrel [with the definitions of specularly reflective offered by Digital Control]."

Nothing in the '332 patent's specification suggests the applicant intended the term specularly reflective to

have a meaning different from its plain meaning. Indeed, the specification makes no attempt to define the term. The same can be said of the prosecution history. "Specular reflection" is defined as "pertaining [\*\*26] to the manner in which light is reflected, as by a mirror or speculum" and a "specular reflector" is "a reflector that exhibits specular reflectance, producing a direct image of its source." The Photonics Dictionary (2000). Naturally, whether a surface is specularly reflective depends on the type of light that is being reflected. Accordingly, we construe "specularly-reflective surface" to be a surface that reflects light as by a mirror or speculum and note that the district court's construction appears to read the term "specular" out of the phrase "specular reflection."

#### *Plurality of Apertures Arrayed Along*

Claim 1 requires that the elongated hollow tube include "a plurality of filtering apertures arrayed along [the] tube for improving the diffusion into and out of the space within the tube." '332 Patent, col. 6, ll. 12-14. The district court construed "a plurality of filtering apertures arrayed along [the] tube" to mean "a sample chamber with a minimum of two apertures located somewhere along the surface of the sample chamber." Finding and Recommendation at 15.

Digital Control asserts that this claim construction gives no meaning to the term "arrayed along," thereby giving [\*\*27] the '332 patent more breadth than that to which it is entitled. Digital Control also asserts that the applicant argued that a combination of references that "clearly shows" two apertures did not suggest the arrayed apertures limitation. We are not persuaded by these arguments.

We agree with the district court's analysis and adopt its construction of this claim limitation.

#### **B**

We now turn to whether under a proper claim construction the district court's grant of summary judgment of noninfringement was nevertheless correct. See [Bio-Rad Labs., Inc. v. Nicolet Instrument Corp.](#) 807 F.2d 964, 969 (Fed. Cir. 1986) (explaining that a court of appeals may affirm the judgment of a district court on any ground, including grounds not relied upon by the district court).

#### *M301A*

The M301A device contains a chamber having only one open end. A chamber is blind bored into a solid aluminum billet, [\*921] then etched and chromated. The light source is inserted through a hole in the side of the chamber rather than introduced at the open end of the tube. The M301A chamber has four apertures to allow the entry and exit of gas, two of which are located near



the side-inserted light [\*\*28] source. The M301A uses only two of these apertures, which are covered by a thick "slip-on 80-pores-per-inch sponge filter element." This porous media is approximately 5000 microns thick.

Given our construction of "semipermeable membrane," the M301A cannot literally infringe claim 1, as it does not have a semipermeable membrane having a thickness less than several hundreds of microns. Furthermore, because the applicant of the '332 patent expressly distinguished his invention from devices using porous materials having a thickness greater than several hundreds of microns, he is estopped from asserting such a device infringes under the doctrine of equivalents. See [Eagle Comtronics, Inc. v. Arrow Communication, 305 F.3d 1303, 1316 \(Fed. Cir. 2002\)](#) (explaining that the doctrine of prosecution history estoppel bars a patentee from asserting as an equivalent subject matter surrendered by argument during prosecution of the patent application). Accordingly, we hold that Digital Control's model M301A cannot infringe claim 1 of the '332 patent under the doctrine of equivalents.

Therefore, we affirm the district court's grant of summary judgment of noninfringement with respect [\*\*29] to Digital Control's model 301A.

#### *M310*

Two versions of the M310 device are accused of infringement. Both are diffusion chambers having four apertures drilled into the wall of the chamber. Two of the apertures are located at nearly equal distances from the end of the chamber on one side of the chamber with the remaining two located on the opposite side in similar positions. In the first M310 version, one of the apertures is blocked with a plastic plug while the aperture in the other side and at the other end of the tube is covered with a calibration nipple, which allows for the tuning of the monitor at a later date. The two remaining holes are covered with a vent tape manufactured by 3M. In the other version of the M310, the chamber has the calibration nipple but not the plastic plug and the remaining three apertures are covered with the vent tape.

We agree with the district court that the M310 devices contain the "plurality of apertures arrayed along" claim limitation. However, genuine issues of material fact exist as to whether the semipermeable membrane limitation and the specularly-reflective surface limitation are met. With respect to both of these limitations there seems [\*\*30] to be a classic "battle of the experts" which renders summary judgment improper.

Edwards's expert, Dr. Kouznetsov, conducted a "modified UL dust test" which suggested that the vent tape in the M310 device effectively prevents unwanted particles the size of dust from entering the sample cham-

ber. Digital Control's expert, Dr. Schaffer, also tested a sample of the vent tape for its permeability of smaller particles. Dr. Schaffer's test included placing a sample of vent tape over the input port of a 0.2 micron filter, drawing a small vacuum through the filter, and placing a sample of standardized zirconia particles (with sizes between 0.2 and 10 microns) on the vent tape. Dr. Schaffer found that about 1/3 of the particles stuck to the tape, 1/3 of the particles stuck to the filter input port, and about 1/3 of the particles passed through to lodge on the 0.2 [\*\*922] micron filter, with the size of the particle apparently not influencing whether that particle passed through the vent tape. Based on this, Dr. Schaffer concluded that the vent tape failed to function as a predetermined size filter at all. This demonstrates a genuine issue of material fact as to whether the M310 devices allow the passage [\*\*31] of airborne particles through it while preventing airborne particles larger than a predetermined size, such as the size of dust and smoke particles, from entering the chamber. Thus, the question of whether the M310 devices infringe this limitation must be remanded for trial.  
n4

n4 While apparently not argued by the parties, the vent tape in the M310 would fall within the thickness required by our claim construction, because it is approximately 100 microns.

The issue of whether the chamber of the M310 devices has a specularly-reflective surface on its inner walls also involves material factual questions. Edward's witness Dr. Kouznetsov performed black paint and gold paint tests to determine whether the Digital Control's chambers produced specular reflection of infrared radiation. He testified that the results of these tests "confirmed that DCS's [Digital Control] chambers utilize specular reflection off the internal walls to conduct the infrared radiation from the source to the detector." Edwards also offered [\*\*32] the testimony of Dr. Worek who conducted experiments with visible light which showed the surface of chamber of a M310 device was specular (defined as a surface which would generally reflect radiation at the same angle as the incident radiation). Based on the results of these experiments and the wavelength of visible versus infrared light, Dr. Worek concluded that the chamber walls would be even more "specular" with respect to infrared light.

Digital Control's evidence included an experiment conducted by its president, Mr. Mueller, which directed a collimated laser beam through an M310 sample chamber to a small screen about 18 inches away. The collimated laser beam scattered as it made its way through the sample chamber in an M310 device and lit up a large area of

the small screen. Mr. Mueller compared this to a collimated laser beam that was reflected off a set of specular reflectors, which resulted in a pin point of light landing on the small screen.

This conflicting evidence demonstrates a classic battle of the experts as to whether the M310 devices have a specularly-reflective surface and thus creates a genuine issue of material fact as to infringement of this limitation. Digital [\*\*33] Control's assertions that Kouznetsov's results are flawed and that Worek's test did not observe reflection at the higher glancing angles that would produce multiple reflections in the chambers go to the strength and credibility of the testimony. As such, it is up to the fact-finder to weigh the merit of these arguments. Thus, whether the M310 device meets this limitation must be resolved on remand.

Accordingly, we hold that the district court erred in granting summary judgment of noninfringement with respect to Digital Control's model M310 and remand the case to the district court for trial of this issue.

### III

In its cross appeal, Digital Control asserts that the district court erred in dismissing its counterclaims for invalidity, unenforceability, and non-infringement and in denying its motion for attorney fees. Because we are

vacating the district court's underlying grant of summary judgment of non-infringement with respect to the M310 device, Digital Control's counterclaims for invalidity, unenforceability, and non-infringement are no longer moot and [\*923] must be reinstated. See [Liquid Dynamics Corp. v. Vaughan Co., Inc.](#), 355 F.3d 1361, 1370 (Fed. Cir. 2004). Additionally, [\*\*34] we vacate the denial of Digital Control's motion for attorney fees in view of our remand for trial.

### IV

In sum, we reverse the district court's claim construction to the extent it conflicts with our construction of the claims as detailed above. We affirm the district court's grant of summary judgment of noninfringement with respect to Digital Control's M301A device. We vacate the district court's grant of summary judgment of noninfringement with respect to Digital Control's M310 device and remand the issue of infringement for trial in view of our claim construction. We also vacate the district court's denial of Digital Control's motion attorney fees and dismissal of Digital Control's counterclaims.

### COSTS

No Costs.

LEXSEE

**NCUBE CORPORATION (now C-COR Inc.), Plaintiff-Cross Appellant, v.  
SEACHANGE INTERNATIONAL, INC., Defendant-Appellant.**

**03-1341, 03-1366**

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

**2006 U.S. App. LEXIS 631**

**January 9, 2006, Decided**

**PRIOR HISTORY:** [\*1] Appealed from: United States District Court for the District of Delaware. Judge Joseph J. Farnan, Jr. [nCUBE Corp. v. SeaChange Int'l, Inc., 313 F. Supp. 2d 361, 2004 U.S. Dist. LEXIS 6488 \(D. Del., 2004\)](#)

**DISPOSITION:** AFFIRMED.

**CASE SUMMARY:**

**PROCEDURAL POSTURE:** A jury found defendant, an alleged infringer, to have willfully infringed certain claims of plaintiff patent owner. The U.S. District Court for the District of Delaware, among other things, vacated the verdict of infringement under the doctrine of equivalents. It also denied the alleged infringer's motion for a new trial, and awarded the patent owner damages and fees. Pending was the alleged infringer's appeal and the patent owner's cross-appeal.

**OVERVIEW:** The patent related to information technology. The court sustained the trial court's denial of Judgment as a Matter of Law (JMOL) on the jury's verdict of literal infringement, deferring to the jury's credibility determinations. Next, the record also contained substantial evidence upon which a jury could have found willful infringement under the clear and convincing evidence standard. It also contained sufficient circumstantial evidence to support the verdict of induced infringement. With regard to fees, the court detected no clear error in any of the trial court's subsidiary factual findings leading to its conclusion that this was an exceptional case under 35 U.S.C.S. § 285. Further, it perceived no abuse of discretion in the trial court's award of attorney fees. Because the weight of the evidence was sufficient for the jury's verdicts on literal infringement, willfulness, and indirect infringement, the court sustained the district court's denial of a new trial. Finally, because evidence and argument on the doctrine of equivalents could not merely be subsumed in the patent owner's case of literal infringement, the patent owner did not satisfy its evidentiary burden on that issue.

**OUTCOME:** The court affirmed the trial court's denials of JMOL on literal infringement and willfulness for all of the systems it sold, its award of enhanced damages and attorney fees, its grant of JMOL on the jury verdict of infringement under the doctrine of equivalents, and its denial of the alleged infringer's motion for a new trial.

**CORE TERMS:** logical, manager, upstream, message, infringement, server, network, addressing, downstream, invention, route, specification, patent, routing, embodiment, virtual, literal, media, willfulness, patentee, willful, packet, new trial, multimedia, destination, protocol, recite, stream, exceptional case, jury verdict

**COUNSEL:** Robert J. Gunther, Jr., Latham & Watkins LLP, of New York, New York, argued for plaintiff-cross appellant. With him on the brief were David A. Nelson and Israel Sasha Mayergoyz, of Chicago, Illinois. Of counsel was Mary B. Graham, Morris, Nichols, Arsht & Tunnel, of Wilmington, Delaware.

Steven M. Bauer, Proskauer Rose LLP, of Boston, Massachusetts, argued for defendant-appellant. On the brief were Robert E. Hillman, Lawrence K. Kolodney, and Steven Katz, Fish & Richardson P.C., of Boston, Massachusetts.

**JUDGES:** Before RADER, Circuit Judge, FRIEDMAN, Senior Circuit Judge, and DYK, Circuit Judge. Opinion for the court filed by Circuit Judge RADER. Dissenting opinion filed by Circuit Judge DYK.

**OPINIONBY:** RADER

**OPINION:** RADER, Circuit Judge.

#### Background

After the U.S. District Court for the District of Delaware construed the [\*2] relevant claims, a jury found SeaChange International, Inc. (SeaChange) to have willfully infringed, literally and under the doctrine of equivalents, claims 1-4, 6-10, 12, and 14 of nCube Corporation's (nCube's) [U.S. Patent No. 5,805,804](#) (Sept. 8, 1998) (the '[804 patent](#)'). The trial judge denied SeaChange's motions for Judgment as a Matter of Law (JMOL) on literal infringement, willfulness, and indirect infringement for incomplete systems sold to Scientific-Atlanta Corp., but vacated the jury's verdict of infringement under the doctrine of equivalents. The judge also denied SeaChange's motion requesting a new trial, and awarded nCube double its actual damages and two-thirds of its attorney fees. Because the court properly decided the JMOL motions, this court affirms. Because the trial court did not abuse its discretion in making its damages and attorney fees awards, this court also affirms those awards.

#### Discussion

This court applies the same standard of review as that applied by the trial court when reviewing a JMOL motion following a jury verdict. See [Callicrate v. Wadsworth Mfg., Inc.](#), 427 F.3d 1361 (Fed. Cir. 2005). Thus, to prevail, SeaChange must show that [\*3] the jury lacked substantial evidence for its verdict, viewing the evidence most favorably to the non-movant. See [Kinnel v. Mid-Atlantic Mausoleums, Inc.](#), 850 F.2d 958, 962 (3d Cir. 1988).

A jury verdict of willfulness requires a finding "by clear and convincing evidence in view of the totality of the circumstances that [the defendant] acted in disregard of the . . . patent and lacked a reasonable basis for believing it had a right to do what it did." [Amsted Indus. Inc. v. Buckeye Steel Castings Co.](#), 24 F.3d 178, 181 (Fed. Cir. 1994). Therefore, "[this court] must determine whether there is substantial evidence, when viewed as a whole, upon which a jury could [find willful infringement] under the clear and convincing evidence standard." [Braun, Inc. v. Dynamics Corp. of Am.](#), 975 F.2d 815, 822-23 (Fed. Cir. 1992).

This court reviews a district court's exceptional case finding for clear error. [Pharmacia & Upjohn Co. v. My-](#)

[lan Pharms., Inc.](#), 182 F.3d 1356, 1359 (Fed. Cir. 1999). Criteria for declaring a case exceptional include willful infringement, bad faith, litigation misconduct, and unprofessional behavior. [\*4] See [Sensonics, Inc. v. Aerosonic Corp.](#), 81 F.3d 1566, 1574 (Fed. Cir. 1996). This court reviews increased damages awards or attorney fees for abuse of discretion. [Electro Scientific Indus., Inc. v. Gen. Scanning Inc.](#), 247 F.3d 1341, 1349 (Fed. Cir. 2001).

The denial of a motion for a new trial is a procedural issue not unique to patent law which this court reviews under the law of the appropriate regional circuit -- in this case, the United States Court of Appeals for the Third Circuit. [Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co.](#), 308 F.3d 1167, 1182 (Fed. Cir. 2002). The Third Circuit reviews a district court's decision whether to grant a new trial on the basis that the verdict is against the weight of the evidence, for abuse of discretion. [Greenleaf v. Garlock, Inc.](#), 174 F.3d 352, 366 (3d Cir. 1999).

#### A. Claim Interpretation

The '[804 patent](#)' claims a "Method and Apparatus for Scalable, High Bandwidth Storage Retrieval and Transportation of Multimedia Data on a Network." The '[804 patent](#)' provides "a better means and method for providing multimedia data in a networked system," (Col. 2, II. 15-16) [\*5] \* by allowing a client flexible access to various multimedia sources over a network. Claim 1 of the '[804 patent](#)' teaches:

1. A high bandwidth, scalable server for storing, retrieving, and transporting multimedia data to a client in a networked system, said server comprising:

an upstream manager receiving messages from said client and routing said messages to an appropriate service on said server, said upstream manager being coupled to a first network; a downstream manager sending a stream of said multimedia data from said appropriate service on said server to said client, said downstream manager being coupled to a second network; and a connection service for maintaining information to connect said

client, said upstream manager, said downstream manager, and said appropriate service on said server.

In the invention, as shown in Fig. 6 from the ['804 patent](#) below, the client communicates his desires to the system using a client device 110. The upstream manager 220 accepts a message, e.g., a request for a particular service, from the client device and routes them to the media server service 322, which will supply that service.

\* All column and line references are to the ['804 patent](#).

[\*6]

[SEE ILLUSTRATION IN ORIGINAL]

The client may request such services as interactive shopping, news, games, education, movies, etc. The downstream manager 210 sends the data, i.e., the requested service, to the client device 110. (Col. 16, II. 11-18) The additional elements in the figure deal with managing the requested service data flows to the requesting client, including obtaining and associating the addresses of the client and the appropriate media server.

This court must interpret the terms governing operation of an "upstream manager" and use of addresses in the invention. As mentioned, the invention of the ['804 patent](#) allows the client to receive requested material from different types of networks. This function, in turn, requires the invention to accommodate the addressing schemes of each separate network, which may differ from one another. In order to accommodate the different types of addresses for each data link, the network protocol of the invention superimposes its own independent addresses on top of those of the nodes used in the diverse links of the various networks. (Col. 13, II. 11-16.) Thus, the invention can route commands and data from the requesting client [\*7] to the appropriate media server by using the system's own network protocol. As part of this scheme, the connection service described in the specification assigns a "logical" (i.e., ad hoc) address to the "physical" address (i.e., the real physical location) of a client, in the connection manager 230. (Col. 17, II. 27-51). The relationship between the logical and related physical addresses is stored in the connection service table 320.

The trial court construed the term "Upstream Manager" as follows:

Upstream Manager: a computer system component that (a) accepts messages from a client bound for services on a server; (b) routes messages from a client to services on a server; and (c) is distinct from the Downstream Manager.

The parties agree on this much of the construction, but SeaChange seeks further limitation. In particular, SeaChange contends that the upstream manager must (d) receive and route all messages from clients that are "bound for" services, and (e) must do so using only logical, not physical, addresses, of both sender and receiver of a message. SeaChange also reserves an argument of noninfringement even under the court's claim construction. [\*8]

The district court's claim construction correctly does not require the upstream manager to receive and route all messages from a client bound for a server. The patent claims require that the upstream manager receive messages from the client and the downstream manager send data to the client, but do not make these the exclusive functions of the units. Figures 1, 2, and 6 of the specification show that the paths from the client to the upstream manager are unidirectionally upward, and from the downstream manager to the client unidirectionally downward, and the text of the specification reflects this asymmetry. (Col. 3, II. 21-22.) However, the specification describes only one embodiment of the invention, and encompasses divergence from that embodiment: "it may be the case that some server process, under the direction of an external network control node, actually establishes contact with the client." (Col. 17, II. 24-26). Thus, the district court correctly stated that the claims encompass this form of communication.

The trial court's construction of "upstream manager" also correctly reflects that this element may route messages using either logical or physical addresses. In the embodiment [\*9] described in the specification "all routing is accomplished based on logical addresses, not physical addresses." (Col. 23, II. 1-4). Thus, "packets (and therefore messages) only contain logical addresses of the sender and receiver." Id. The logical address of a client is used to establish a unique "virtual circuit" for connection with that client. (Col. 17, II. 28-48). However, the upstream manager of claim 1 is broader than the upstream manager of this embodiment. The creation of a virtual circuit, or "virtual connection," appears only in dependent claim 2 as a "further" function of the connection service. The use of a client logical address first appears specifically only in claim 4. The embodiment described in the specification, in which the service request



message includes the client's downstream logical address and a service destination logical address, is specifically described in unasserted claims 5 and 11. Claim 1 does not describe an upstream manager that requires routing only with logical addresses. To read a requirement for use of logical addresses into claim 1 would impermissibly read the "virtual connection" limitation of claim 2 into claim 1, making these claims redundant. [\*10] See, e.g., [LizardTech, Inc. v. Earth Res. Mapping, Inc.](#), 424 F.3d 1336, 1344 (Fed. Cir. 2005). In this case, the claim term "upstream manager" is not "so amorphous that one of skill in the art can only reconcile the claim language with the inventor's disclosure by recourse to the specification." [Comark Commc'ns, Inc. v. Harris Corp.](#), 156 F.3d 1182, 1187 (Fed. Cir. 1998). It is clear that the upstream manager of claim 1 routes messages. This court need not interpret what the patentee meant by "upstream manager" in this claim by importing the limitation of claim 2 into this term. See [E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.](#), 849 F.2d 1430, 1433 (Fed. Cir. 1988) (holding that it is improper to read a limitation "into a claim from the specification wholly apart from any need to interpret what the patentee meant by particular words or phrases in the claim."). The prosecution history does not contradict the district court's interpretation. During prosecution, the inventor differentiated the invention from the prior art of Mizuhara in several ways: not only by describing the uniqueness of its use of logical addresses, but also [\*11] by demonstrating that Mizuhara did not teach a partitioned architecture, separating the functions of upstream and downstream managers, and connection service.

#### B. Infringement

SeaChange's systems, used by cable TV networks, are illustrated below.

[SEE ILLUSTRATION IN ORIGINAL]

In these systems, the hardware is part of a uniform network although the physical connections within the network may be of various physical types, such as coaxial cable or optical fiber. Addressing protocols are uniform throughout these systems. To receive a particular program, a client requests the program from the CM block through the block labeled DNCS. The CM then finds a free transmission channel, assigns the desired program to the free channel, and instructs the client to "tune" to that channel. In SeaChange's Cable TV systems, the only message received (and "routed") from the client is the request for service, which the DNCS routes to the CM. The client may interact with the service, to start, stop, rewind, etc., but that interaction is directly with the service provider.

nCube asserted at trial that the DNCS "functions as" an upstream manager, the media cluster (the star in the Figure) "operates [\*12] as" the downstream manager, and the connection manager and streaming service "constitute a single component" which "ties" all the resource elements together. The jury agreed, finding that SeaChange literally infringed the ['804 patent](#). SeaChange contends that its DNCS is not an upstream manager as that unit was construed by the district court.

The jury heard extensive evidence on infringement. The evidence included the testimony of nCube's expert, Dr. Schonfeld, who opined that the DNCS routes messages to services on the server. This expert specifically stated that the upstream manager in the SeaChange system is the DNCS, which receives messages from the set-top device, and sends messages over the network. Dr. Schonfeld further opined that the DNCS routes a service request from a client to watch a specific movie. Thus, he identified the DNCS as the upstream manager. On cross-examination, Dr. Schonfeld repeated his opinion that the DNCS is an upstream manager. The jury was also presented with evidence from SeaChange's technical documents which, it could have concluded, confirmed Dr. Schonfeld's opinion that SeaChange's DNCS receives messages and performs routing. SeaChange does not [\*13] cite any expert or other testimony presented to the jury that contradicts Dr. Schonfeld's opinion.

SeaChange argues to this court that this expert opinion is contradicted by the factual record and thus cannot support the jury's verdict. See [Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.](#), 509 U.S. 209, 242, 113 S. Ct. 2578, 125 L. Ed. 2d 168 (1993) ("When an expert opinion is not supported by sufficient facts to validate it in the eyes of the law, or when indisputable record facts contradict or otherwise render the opinion unreasonable, it cannot support a jury's verdict."). However, Dr. Schonfeld supported his opinion by relying on SeaChange's own technical documents. Although the jury was not required to accept that opinion, even if it was not contradicted, [U. S. Philips Corp. v. Windmere Corp.](#), 861 F.2d 695, 704 (Fed. Cir. 1988), it found Dr. Schonfeld credible. This court declines to "second guess" the jury's determinations. [Comark](#), 156 F.3d at 1192 ("It is not the province of an appellate court to second guess the jury's credibility determinations or to reevaluate the weight to be given the evidence.") The district court accorded the jury appropriate deference. [\*14] See [Fuji Photo Film Co., Ltd. v. Jazz Photo Corp.](#), 394 F.3d 1368, 1379 (Fed. Cir. 2005). Therefore, this court sustains the district court's denial of JMOL on the jury's verdict of literal infringement.

#### B. Willful Infringement

The jury also found willful infringement. Willfulness requires a showing that the totality of the circumstances evince the egregious conduct that constitutes willful infringement. [Imonex Servs., Inc. v. W.H. Munzprufer Dietmar Trenner GMBH](#), 408 F.3d 1374, 1377 (Fed. Cir. 2005).

Actual notice of another's patent rights triggers an affirmative duty of due care to avoid infringement. See [Rolls-Royce Ltd. v. GTE Valeron Corp.](#), 800 F.2d 1101, 1109 (Fed. Cir. 1986). Willful infringement in this case hinges on when the defendants had actual knowledge of plaintiff's patent rights, and their actions after that time. nCube does not argue that SeaChange knew of the '[804 patent](#)' before it filed suit, but rather attacks Seacube's reliance on the opinion letter it obtained after suit was filed. nCube asserts that the opinion letter, which counsel shared with SeaChange management, was flawed because SeaChange manipulated [\*15] the information given to counsel to ensure an opinion of non-infringement. nCube also casts doubt on the trustworthiness of the letter because SeaChange produced early drafts of the letter only after trial.

The record shows that at least one important technical document was not supplied to SeaChange's opinion counsel. Thus, "the best information [was] intentionally not made available to counsel during the preparation of the opinion, [so that] the opinion can no longer serve its prophylactic purpose of negating a finding of willful infringement." [Comark](#), 156 F.3d at 1191. Therefore, the record contains substantial evidence upon which a jury could have found willful infringement under the clear and convincing evidence standard.

#### C. Indirect Infringement

SeaChange sold systems without the DNCS component to Scientific-Atlanta Corp. because Scientific-Atlanta cable systems contained their own equivalents of this component. The court's unopposed jury instructions stated that SeaChange "would be an infringer if it actively and knowingly aided or abetted someone to make, use, sell, or offer to sell the entire product covered by the claims of the patent in suit. This [\*16] is called inducing infringement." See [Hewlett-Packard Co. v. Bausch & Lomb, Inc.](#), 909 F.2d 1464, 1469 (Fed. Cir. 1990) (stating that "proof of actual intent to cause the acts which constitute the infringement is a necessary prerequisite to finding active inducement" under [35 U.S.C. § 271\(b\)](#)). However, the jury verdict form did not distinguish these systems from others sold by SeaChange. Thus, the jury's verdict that SeaChange was guilty of inducing infringement for sales of these systems was subsumed into its overall verdict of infringement.

On appeal, SeaChange argues that sales of its systems to customers using Scientific-Atlanta network

equipment could not constitute indirect infringement. SeaChange asserts that there is no evidence that it knew that these sales would result in actual infringement of the patent, so that SeaChange could not have intended to induce infringement.

To show intent for indirect infringement, "a patentee must be able to demonstrate at least that the alleged inducer had knowledge of the infringing acts." [MercExchange, LLC v. eBay, Inc.](#), 401 F.3d 1323, 1332 (Fed. Cir. 2005). SeaChange argues that [\*17] it did not have such knowledge because it did not know of nCube's infringement allegations until this lawsuit was filed, and at that time it consulted counsel, who advised that the design of its system did not infringe the '[804 patent](#)'. In its finding of willfulness, however, the jury found otherwise.

A patentee may prove intent to induce infringement through circumstantial evidence. [Metabolite Labs, Inc. v. Labs. Corp. Am.](#), 370 F.3d 1354, 1365 (Fed. Cir. 2004). The record contains sufficient circumstantial evidence to support the jury's verdict of induced infringement. This evidence included SeaChange's documents, as well as the testimony of SeaChange's vice-president of engineering, which showed that the SeaChange system operated with a customer's own DNCS component. The record shows that SeaChange sold ITV systems for use with Scientific-Atlanta equipment with the intent that customers would use them to perform the patented method, thus supporting the jury's incorporation of these systems in its verdict of literal infringement.

#### D. Enhanced Damages and Attorney Fees

Defendants dispute the finding by the trial court that this case is exceptional. In an exceptional [\*18] case, a court may award attorney fees. [35 U.S.C. § 285](#) (2000). Further, "the trial court has broad discretion in the criteria by which it determines whether to award attorney fees." [Brooktree Corp. v. Advanced Micro Devices, Inc.](#), 977 F.2d 1555, 1582 (Fed. Cir. 1992).

The trial court awarded enhanced damages on the basis of the jury's willfulness finding and the Read factors for enhancing damages. See [Read Corp. v. Portec, Inc.](#), 970 F.2d 816 (Fed. Cir. 1992). Most importantly, the court found that the case for literal infringement was not close. Moreover, SeaChange deliberately copied the invention in its products without investigating the scope of the patent. Thus, SeaChange had not formed a good faith belief excusing its conduct. Accordingly, the trial court declared this an exceptional case under [35 U.S.C. § 285](#) and awarded attorney fees. This court detects no clear error in any of the court's subsidiary factual findings leading to its conclusion that this was an exceptional case. Further, this court perceives no abuse of discretion in the trial court's award of attorney fees.

## E. Denial of Motion [\*19] for New Trial

As discussed above, the weight of the evidence was sufficient for the jury's verdicts on literal infringement, willfulness, and indirect infringement. Therefore, this court sustains the district court's denial of a new trial.

## F. Cross-Appeal on Infringement under the Doctrine of Equivalents

The jury held that SeaChange's systems infringed the '804 patent under the doctrine of equivalents. The trial court granted nCube's JMOL motion on this decision. During trial nCube did not raise separate and distinct arguments for infringement under the doctrine of equivalents, and elicited no expert testimony on this subject. nCube argues nevertheless that the record contains substantial evidence supporting the jury's verdict, because the evidence supporting literal infringement of claim 10 also supports a finding of infringement under the doctrine of equivalents.

To the contrary, this court has articulated distinct rules for the evidence showing infringement under the doctrine of equivalents. See Texas Instruments, Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1566-68 (Fed. Cir. 1996). "The party asserting infringement must present 'evidence and [\*20] argument concerning the doctrine and each of its elements.' The evidence and argument on the doctrine of equivalents cannot merely be subsumed in plaintiff's case of literal infringement." Lear Siegler, Inc. v. Sealy Mattress Co. of Mich., Inc., 873 F.2d 1422, 1425 (Fed. Cir. 1989) (Internal citations omitted) (Emphasis in original). Not having satisfied this evidentiary burden, nCube's arguments do not persuade this court.

## Conclusion

For the reasons stated above, this court affirms the trial court's denials of JMOL on literal infringement and willfulness for all of the systems it sold, its award of enhanced damages and attorney fees, its grant of JMOL on the jury verdict of infringement under the doctrine of equivalents, and its denial of defendant's motion for a new trial.

## COSTS

Each party shall bear its own costs.

## AFFIRMED

## DISSENTBY: DYK

## DISSENT: DYK, Circuit Judge, dissenting.

While I agree with much of the majority opinion, I respectfully dissent from the majority's decision upholding the verdict of infringement. In my view there was

insufficient evidence that the requirement of an "upstream manager" was satisfied. The majority has broadened [\*21] a poorly drafted patent to cover an invention that was not actually claimed or described in the specification.

## I

The '804 patent claims a "Method and Apparatus for Scalable, High Bandwidth Storage Retrieval and Transportation of Multimedia Data on a Network." It relates to an "information storage and transport system[]" which delivers "data streams over a network," from a server to client devices. Col. 1 II. 10-11. The system supports various types of client devices, including "set-top boxes" (which permit consumers to download video and view it on their television sets), personal digital assistants, and video phones. Col 2 II. 18-20; Col 3 II. 23-28. Claim 1 of the '804 patent recites:

1. A high bandwidth, scalable server for storing, retrieving, and transporting multimedia data to a client in a networked system, said server comprising:

an upstream manager receiving messages from said client and routing said messages to an appropriate service on said server, said upstream manager being coupled to a first network; a downstream manager sending a stream of said multimedia data from said appropriate service on said server to said client, said downstream manager [\*22] being coupled to a second network; and a connection service for maintaining information to connect said client, said upstream manager, said downstream manager, and said appropriate service on said server.

Col. 25 II. 1-16 (emphases added). The server stores and manages various types of data, including audio and video, and sends that data to client devices upon request. Col. 2 II. 31-38. The component of the server that sends the data to the clients is called a "service."

The client and server communicate via components called the "upstream manager" and "downstream manager." "The upstream manager 220 (USM) accepts messages from [client devices] and routes them to services on the media server 100." Col. 16 II. 11-13. The media server then supplies the requested service to the client device via the "downstream manager," which "sends a stream of data [from the services on the media server] to a [client device]." Col. 16 II. 17-18.

The key innovation of the '['804 patent](#)' relates to how the upstream and downstream data are "addressed" to their recipients. Col. 13 II. 11-16. In computer networks, data is sent between the client and server in the form of "data packets, [\*23] " each of which contains its own destination address. Col. 16 II. 24-39. The '['804](#) innovation provided an approach that did not utilize the "physical" address of the recipient of the data packets. The physical address is "the actual, machine address of an item or device." A. Freedman, *The Computer Glossary* (9th ed. 2001). It "reflects the physical topology of the network . . . ." *Dictionary of Computing* 9 (4th ed. 1996) (defining "addressing"). However, keeping track of physical addresses is complicated when data packets must be sent between different types of networks that use different physical addressing schemes. Col. 13 II. 11-15. The present invention resolves this problem by "defining its own independent address space," called a "logical" address space. *Id.*; see generally Col. 12 I. 31 -- Col. 15 I. 56. A logical address "reflect[s] the administrative or functional relationships [among the addressed entities]." Oxford, *supra* at 9. n1 Data packets that are sent between the server and client are routed using this logical addressing scheme. The specification states that "it is important to note that all routing is accomplished based on logical addresses, not [\*24] physical addresses." Col. 23 II. 1-2 (emphasis added).

n1 A telephone number is an example of a logical address, while the port to which the telephone is connected is a physical address. Newton's *Telecom Dictionary* 645 (21st ed. 2005). "A logical address . . . may have no fixed physical address." *Id.* That is, a person might move from one home to another, keeping the same telephone number.

The "upstream manager" is a key component in this system, and is required by every claim in the '['804 patent](#).' The district court construed the term "upstream manager" as "a computer system component that (a) accepts messages from a client bound for services on a server; (b) routes messages from a client to services on a server; and (c) is distinct from the downstream manager." nCube

Corp. v. SeaChange Int'l, No. 01-11-JJF, slip op. at 9 (N.D. Del. May 23, 2002). Under this claim interpretation, it sustained the jury's verdict that Seachange infringed claims 1-4, 6, 7, 9, 10, 12, and 14 of the '['804 patent](#).' The majority upholds the district court's claim construction. Seachange argues, and I agree, that this claim construction erroneously omitted the further requirement [\*25] that the upstream manager route messages bound for services on the server using logical addresses. Under the proper claim construction, there was insufficient evidence to support the verdict of infringement because there is no evidence the accused device uses logical addresses for any purpose.

## II

Under Phillips, "the words of a claim 'are generally given their ordinary and customary meaning,' [which] . . . is the meaning that the [words] would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." [Phillips v. AWH Corp.](#), 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc) (internal citations omitted). The specification plays a key role in determining this meaning: "the specification is 'always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* at 1315 (quoting [Vitronics Corp. v. Conceptronic, Inc.](#), 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Ultimately, "the construction that stays true to the claim language and most naturally aligns with [\*26] the patent's description of the invention will be, in the end, the correct construction." *Id.* at 1316; see also [V-Formation, Inc. v. Benetton Group SpA](#), 401 F.3d 1307, 1311 (Fed. Cir. 2005) (restricting the meaning of the claim term "releasably attaching" to require that the attached components be easily removed and replaced). Here, the construction of "upstream manager" that most naturally aligns with the '['804 patent](#)'s description of the invention requires the use of logical addressing.

The use of logical addressing is a critical part of the invention embodied in the '['804 patent](#).' A section of the patent entitled "The Network Protocol of the Present Invention" describes logical addressing, and explains why routing by logical addressing is important: "because a packet may travel through several different types of underlying networks, each with their own [physical] addressing schemes, the network protocol of the present invention defines its own independent [logical] address space. This technique hides the many different types of addresses in use for each type of data link." Col. 13 II. 11-16; see also Col. 12 I. 31 -- Col. 15 I. 56. Hence, "the [logical [\*27] addressing scheme] of the present invention provides the communication backbone that allows services scattered across heterogeneous, asymmetric networks to communicate with each other transparently."



Col. 12 I. 32-35. It "enables [services] to communicate transparently across the complex asymmetrical networks . . . ." Col. 15 II. 50-53.

As noted above, "the upstream manager 220 (USM) accepts messages from [client devices] and routes them to services on the media server 100." Col. 16 II. 11-15. The specification reveals that the upstream manager accomplishes this routing using logical addressing. The patent describes the upstream manager and downstream manager as a "gateways that bridge . . . different types of networks." The upstream manager bridges these different types of networks by routing messages (which contain only logical addresses) from clients to their server destinations. Col. 16 II. 24-25. The downstream manager completes the bridge by directing the downstream data stream to its ultimate destination. As noted above, the use of the independent, logical addressing scheme "hides the many different types of [physical] addresses in use" in the underlying networks. Col. [\*28] 13 II. 14-15. Because these physical addresses are hidden, the client device is relieved of the burden of identifying the upstream physical destinations of the messages it sends; it relies on the upstream manager to perform this routing function.

Nowhere does the '804 patent disclose or suggest that the upstream manager routes messages from a client using physical, as opposed to logical addresses. Indeed, if the upstream manager could not route messages from the client using logical addresses, then the purpose of the invention--to substitute logical for physical addresses--would be defeated. See col. 13 II. 14-15. The patentee here offered no expert testimony suggesting that those skilled in the art would not read the patent to include a device using logical addresses.

### III

The majority relies on three theories in support of the proposition that "the [upstream manager] may route messages using either logical or physical addresses." Maj. Op., ante, at 6-7.

First, although the majority appears to recognize that there is no reference in the specification to the use of physical addresses, the majority suggests that the specification's explicit statement that "all routing is [\*29] accomplished based on logical addresses, not physical addresses" applies only to the preferred embodiment. Col. 23 II. 1-2.

Of course, that a patent describes only a single embodiment does not mean the claims of the patent must be construed as limited to that embodiment. See, e.g., [Liebel-Flarsheim Co. v. Medrad, Inc.](#), 358 F.3d 898, 906 (Fed. Cir. 2004). However, the claims will be read restrictively if the patentee has demonstrated a clear inten-

tion to limit the claim scope. Id.; see also [Teleflex, Inc. v. Ficosa N. Am. Corp.](#), 299 F.3d 1313, 1327 (Fed. Cir. 2002). Moreover, "the characterization of [a limitation] as part of the 'present invention' is strong evidence that the claims should not be read to encompass the opposite structure." [SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.](#), 242 F.3d 1337, 1343 (Fed. Cir. 2001); see also [Wang Lab., Inc. v. America Online, Inc.](#), 197 F.3d 1377, 1383 (Fed. Cir. 1999); [Modine Mfg. Co. v. U.S. Int'l Trade Comm'n.](#), 75 F.3d 1545, 1551 (Fed. Cir. 1996).

Here, the patentee clearly demonstrated that the upstream manager accomplishes routing by logical [\*30] addressing. The specification characterizes the "present invention" as including the logical addressing limitation:

"because a packet may travel through several different types of underlying networks, each with their own [physical] addressing schemes, the network protocol of the present invention defines its own independent [logical] address space. This technique hides the many different types of addresses in use for each type of data link."

Col. 13 II. 11-16 (emphasis added). Under SciMed, the use of the term "present invention" is strong evidence that the use of logical addressing applies to the invention as a whole, not just the preferred embodiment. Moreover, as noted above, if the client could not send messages using logical addresses, the purpose of the "present invention"--to substitute logical for physical addresses--would be defeated.

Second, the majority urges that reading claim 1 to include a logical addressing limitation would "impermissibly read the 'virtual connection' limitation of claim 2 into claim 1, making these claims redundant." Maj. Op. at 6-7. Claim 2 recites: "The server in claim 1 wherein said connection service further creates [\*31] a virtual connection between an upstream address and a downstream address for said client." Col. 25 II. 17-20. Even assuming that logical addressing is sufficient to create a virtual connection, reading claim 1 to include logical addressing does not make the two claims redundant, because claim 1 does not contain a requirement that the connection service create a virtual connection. Claim 2 adds simply that requirement. There is thus no inconsistency in reading "upstream manager" in claim 1 to require logical addressing.

Third, the majority points out that unasserted claims 5 and 11 specifically refer to logical addresses. Maj. Op.



at 6-7. In contrast, the asserted claims do not. The majority suggests that the presence of the references to logical addresses in the unasserted claims indicates that the omission of logical addresses from the asserted claims was intentional; hence, the asserted claims do not require logical addressing. *Id.*

In my view the majority misreads claims 5 and 11 to add the requirement that routing be accomplished by logical addressing. *Id.* Rather, these claims simply recite a specific means of using logical addresses that are already required by the [\*32] upstream manager. Claim 5 recites:

5. The computer-implemented method in claim 4 wherein further comprising the steps of:

receiving a service request message from said client to said server via said upstream manager, said service request corresponding to said service on said server, said service request message including said client downstream logical address and a service destination logical address;  
generating a response message from said server to said client, said response message including said client downstream logical address; and sending said response message to said client via said downstream manager.

Col. 25, II.43-55 (emphases added). Claim 5 describes a method of handling logical addressing when a specific type of message--a service request message--is sent by the client device. It describes a situation in which the client logical address and downstream logical address are provided in the service request message, and a response is generated which includes the downstream logical address. The purpose of the claim is to claim that particular method, not to add a requirement for logical addressing. Therefore the omission of the term "logical [\*33] address" from the asserted claims does not reflect the claimant's intent that logical addressing not be part of those claims. The same analysis applies to Claim 11, which rewrites Claim 4 in means-plus-function form. n2

n2 Claim 11 recites:

11. The server as claimed in claim 10 further including:

means for receiving a service request message from said client via said upstream manager, said service request corresponding to said service on said server, said service request message including said client downstream logical address and a service destination logical address;  
means for generating a response message to said client, said response message including said client downstream logical address; and  
means for sending said response message to said client via said downstream manager.

Col. 26, II. 32-46. Claim 11 describes a server which includes several means directed to the handling of logical addressing when a specific type of message is sent by the client device. The purpose of the claim is to claim those particular means, not to add a requirement for logical addressing.

In my view the upstream manager includes a requirement that the upstream [\*34] manager route messages using logical addresses. Because nCube presented no evidence that the alleged upstream manager in the accused device uses logical addresses to send messages to any service on the server, I would reverse the verdict of infringement. I thus would not reach the question--addressed by the majority--whether all client communications must be routed through the upstream manager.

# **Practical Dehydration**

Maurice Greensmith

2<sup>nd</sup> edition



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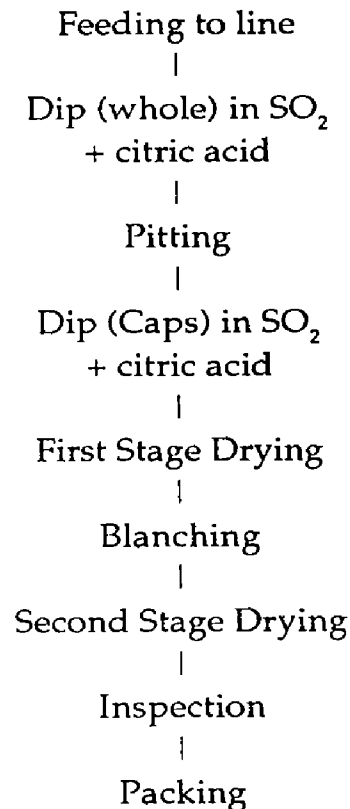
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No claim to original US Government works  
International Standard Book Number 0-8493-1175-6

Printed in the United Kingdom.

**(5) Storage**

Fresh apples may be stored in chill rooms at -1 °C to +3 °C at 85-90% RH for up to 8 months.

**Apricot (Halves)****(1) Flow-sheet****(2) Varieties (recommended)**

Blenheim. (USA)

Matalya (Middle East)

**(3) Product Handling**

Feeding to line is by bulk feeder, whence the fruit is elevated into a sulphite dip tank holding a solution of 2 percent sodium metabisulphite plus 0.5 percent citric acid, duration 5 minutes.

Fruit is dewatered on a stainless screen and fed on to an inspection conveyor for pitting by hand, or alternatively elevated into an apricot pitting machine. Manually fed machines are also available from FMC.

Caps are elevated into a second sulphiting tank with the same concentration as the initial dip, duration 1 1/2 minutes, followed by dewatering.

First stage drying is carried out on trays (stainless mesh) the halves being in 'cup-up' position, ie, cut surface upwards.

Trays are transferred to a steam blancher (belt-type) with transit time

giving exposure to steam for 4 to 5 minutes.

Trays are transferred to a secondary dryer and in the final stage caps are reversed to 'cup-down' position. This reversal can be effected mechanically.

Bin Drying to achieve moisture equilibrium.

Inspection and Packing. Inspection belts should always be fitted with permanent magnets and metal detectors (non ferrous).

#### (4) Drying

Stove or Tunnel Dryers should be used in view of the lengthy drying cycle and the necessity of primary and secondary drying as separate operations.

First stage drying is for 2 1/2 - 3 hours with tray loading at 10kg per sq m. In this stage the weight reduction is 50% of the feed weight. Inlet temperature 71°C cup-up position.

The second stage drying is for 5 1/2 - 7 hours at 71°C reducing to 65°C half-way through the cycle at which stage the cups are reversed to cup-down position.

Bin Conditioning at 49-50°C to achieve moisture equilibrium at 20-22%.

Overall ratio: 8 : 1

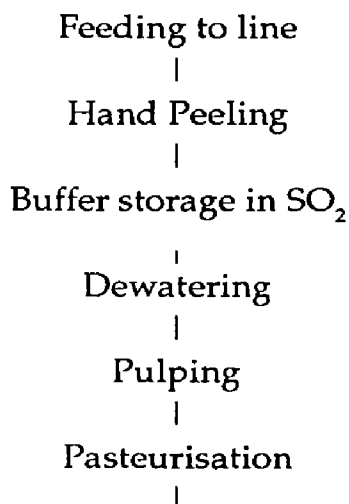
Drying down ratio. 7.46 : 1.

#### (5) Equipment

Mechanical and manual apricot pitters and cup-up and cup-down machines can be supplied by Food Machinery Corp of San Jose, Cal. or FBR SrL of 43100 Parma, Italy.

### Banana Flakes

#### (1) Flow-sheet





for drying and the operation would be more viable if it were combined with canning, where the larger diameter fruit could be diverted for this purpose. The standard high speed high capacity Honiron pineapple grader, made by the Carter company, has a capacity of up to 60 tons per hour; therefore, for a smaller operation, a simple fruit or vegetable grader would have to be adapted.

Sizing and coring is usually carried out on a Honomach Ginaca machine set for a specific size and operating at 120 pineapples per minute. Alternatively, if small fruit are going to be used the Carter Co can offer a small Sizer-Corer to handle 7cm fruit at half the price of the Ginaca.

After sizing and coring, which implies the removal of the skin and coring down the centre of the fruit, a cylinder of fruit is left, which passes on to a stainless steel conveyor belt for inspection and trimming if required.

The trimmed cylinders are then conveyed into a pineapple slicer, thence to a Honiron segment cutter, which will produce dice, spears, titbits or chunks. This is a relatively small capacity machine but is probably relevant in context of a medium sized drying project.

The comminuted pieces are then sulphited by immersion in a sulphiting tank, dewatered and passed to the dryer. After conditioning, the fruit is inspected screened and packed.

#### **(4) Drying**

For a medium sized operation, probably a double tray dryer or stove dryer is most suitable, and again a lower temperature is often used in the first stage - 63°C - finishing at 65°C - 68°C. This tends to prevent caramelisation of the sucrose in the fruit. Raw Moisture is about 85%.

Moisture content in the end-product ranges from 15 to 18%.

Drying ratio: 6:1

Overall ratio depends on crown weight and sizing losses, which could be up to 50%. This would create an overall ratio of 12:1.

#### **(5) Equipment Suppliers**

Special pineapple plant:

Carter Co Inc 91-060 Hanua Street, Ewa Beach, Hawaii 96706.

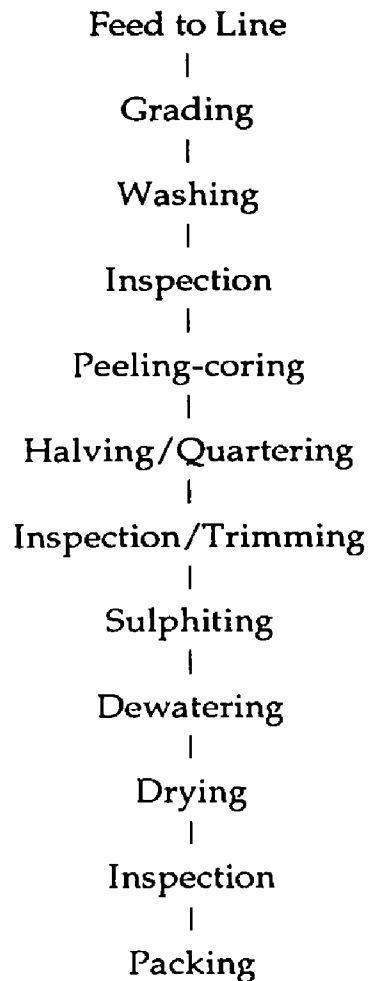
or FMC International AG 1459 Coleman Avenue, Box 1178, San Jose, CA 95108 USA.

#### **Pears**

##### **(1) Flow-Sheet**

Maturing

|



## **(2) Varieties**

Williams Bon Chretien (Bartlett)

## **(3) Product Handling**

Whilst William's are probably the best variety for processing they are somewhat difficult to produce for processing at the critical stage of maturity, and it is almost impossible to pick off the tree and transfer to the factory at this stage, as in 2 to 3 days after ripening they soften and become flavourless and rapidly deteriorate. It is necessary, therefore to pick them green at a specific Maturometer reading, hold in store in boxes at 16° to 18°C in 85 percent humidity. They are tested daily with a Maturometer, and fed into the plant when exactly ripe for processing.

Pears for dehydration should not be too large, as this would prolong the drying cycle. 50 to 60mm diameter is about the top limit for size, and 45mm the lowest calibration.

The graded fruit is separated into two sizes, which are transferred separately into a fruit washer, then inspected for damaged or blemished pears.

The fruit is then conveyed into an Atlas Pacific Pear peeling, coring, and halving unit with waste conveyors. If required the fruit could be quartered instead of halved. Each Atlas unit requires one operator and handles 750-800kg per hr depending on the size of fruit. As there is an hydro-feed tank in the Atlas Pacific plant, the preliminary wash may not be thought necessary, and is therefore optional.

The cut pears are then passed over an inspection belt for trimming so that any seed cells which may have been missed by the peeling plant, or any discoloured flesh are removed.

The product is then sulphite dipped and dewatered. A sulphite solution vessel and stirrer are located alongside the applicator tank to make up the concentrated solution, which is metered in, to maintain the SO<sub>2</sub> level. Drying is by stove or tunnel dryer, as the cycle is 12-18 hours depending on piece size. Low drying temperatures must be observed in order to retain the cream colour of the pears.

The dried halves or segments are inspected and packed in the same way as for apples and apricots.

#### **(4) Drying**

Tray loading is about 10kg per square metre.

Inlet temperature at the hot end should not exceed 65°C and 57°C at the cool end. Conditioning at 49°C to 50°C.

Dry down to 20 - 22%.

Raw moisture = 85%.

Overall ratio = 10.5:1 to 11:1

Drying ratio = 5:1

#### **(5) Equipment Suppliers**

Complete pear peeling, coring and cutting plant:

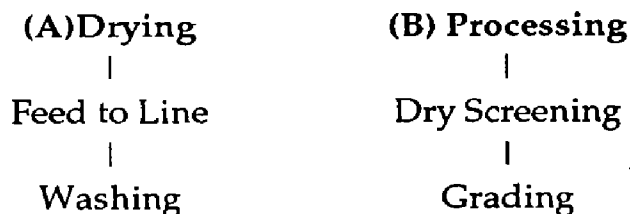
Atlas Pacific Engineering Co 67th and Hollis Street,  
Emeryville, CA 94608 USA.

Maturometer (hand machine): FMC.

Pear core trimmers: FMC (hand tool).

#### **Plums (Prunes)**

##### **(1) Flow-Sheet**



LEXSEE

**WHIRLPOOL CORPORATION and WHIRLPOOL PATENTS COMPANY, Plaintiffs and Counterdefendants, v. LG ELECTRONICS, INC. and LG ELECTRONICS U.S.A., INC., Defendants and Counterplaintiffs.**

**Case No.4:03-CV-113**

**UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF MICHIGAN, SOUTHERN DIVISION**

**2004 U.S. Dist. LEXIS 28447**

**August 2, 2004, Decided**

**CASE SUMMARY:**

**PROCEDURAL POSTURE:** Plaintiff patent holders sued defendant competitors, alleging that the competitors infringed the holders' patent pertaining to washing and rinsing methods used in automatic washing machines. The parties disputed the meaning of claim terms and the court considered the parties' proposals for construction of the disputed terms.

**OVERVIEW:** Upon consideration of the disputed claim terms, the court first found that a wash chamber rotatable about a horizontal axis only required that the axis be substantially horizontal. Further, directing a recirculating spray onto fabric in the wash chamber did not preclude the fabric from also tumbling through a pool of detergent solution in the wash chamber, and a concentration level of detergent solution permitted varying concentration levels. Also, directing the recirculating spray for a period of time included both fixed, predetermined lengths of time and open, unspecified lengths of time, and a patent claim did not require tumbling of clothes to stop between dilution steps. In addition, the fact that the detergent solution was mixed prior to being directed onto clothes did not require mixing to occur in any particular location such as a separate mixing tank, the word "onto" did not require the solution to be directed from above, and "sensing" referred to sensing the amount of detergent solution released from clothes rather than the amount of solution in the wash chamber. Furthermore, fresh water, meaning newly added water, was required to cool and rinse the clothes.

**OUTCOME:** The court construed the disputed claim terms.

**CORE TERMS:** fabric, detergent, chamber, concentrated, patent, water, period of time, tumbling, specification, concentration, tumble, fresh water, recirculating, invention, clothes, embodiment, spray, horizontal axis, predetermined, spraying, washer, washing, speed, pool, lesser, spin, machine, rinsing, gravity, rinse

**COUNSEL:** [\*1] For Plaintiff(s): Daniel A. Boennen/Mary C. Bonnema/Christopher E. Tracy/G. Thomas Williams.

For Defendant(s): Stephen P. Afendoulis/Chi Hyong Kang/Anand K. Sharma/Andrew Chanhon Sonu/Richard Lee Stroup/Bryan R. Walters/John Matthew Williamson.

**JUDGES:** HON. GORDON J. QUIST.

**OPINIONBY:** GORDON J. QUIST

**OPINION:**

**OPINION RE CLAIM CONSTRUCTION**

Plaintiffs, Whirlpool Corporation and Whirlpool Patents Company ("Whirlpool"), charge Defendants, LG Electronics, Inc. and LG Electronics U.S.A., Inc. ("LG"), with infringing at least claims 1-4, 8-11, and 15-17 of [U.S. Patent No. 5,219,370](#) ("the '370 patent") and at least claims 1, 5, 6, 8, 11, and 12 of U.S. Patent No. 5,233,718 ("the '718 patent"). The patents pertain to wash-

ing and rinsing methods used in automatic washing machines. Before the Court are the parties' proposals for construction of disputed claim terms in the '370 and '718 patents as required pursuant to [Markman v. Westview Instruments, Inc.](#), 52 F.3d 967 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370, 134 L. Ed. 2d 577, 116 S. Ct. 1384 (1996). On July 15, 2004, the Court conducted a Markman hearing. Having received the parties' briefs and various exhibits and [\*2] heard the arguments of counsel, the Court now makes the following findings and conclusions regarding the construction of the disputed patent claim terms.

### **I. Standard of Review**

Before a fact finder can determine whether there has been an infringement of a patent, the Court must first construe the patent claims alleged to be infringed to ascertain their meaning and scope. See [Markman](#), 52 F.3d at 976. This step of the process is called claim construction. Claim construction is a matter of law, exclusively within the Court's province, while infringement is an issue of fact. [Id.](#) at 979.

In the Supreme Court's Markman decision, and in numerous decisions from the Federal Circuit, certain principles of patent claim construction have emerged to guide this Court. The Supreme Court has emphasized that the purpose of patent claims is to apprise the public of what is protected by a particular patent. See [Markman](#), 517 U.S. at 373, 116 S. Ct. at 1387 ("A patent must describe the exact scope of the invention and its manufacture to 'secure to [the patentee] all to which he is entitled, [and] to apprise the public of what is still [\*3] open to them.'") (quoting [McClain v. Ortmyer](#), 141 U.S. 419, 424, 35 L. Ed. 800, 12 S. Ct. 76, 77, 1891 Dec. Comm'r Pat. 532 (1891)). In other words, the claims in the patent provide the "metes and bounds of the right which the patent confers on the patentee to exclude others from making, using, or selling the protected invention." [Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.](#), 868 F.2d 1251, 1257 (Fed. Cir. 1989). Although construction of patent claims is similar to construction of any written document, and general principles of construction are used, special considerations apply to patent claim construction based on the need for the public and other inventors to know as precisely as possible the scope of the patentee's claims. Thus, the Court looks primarily to matters in the public record when construing patent claims.

Exactly what constitutes the "public record" has been described in various Federal Circuit decisions. As stated in [Burke, Inc. v. Bruno Independent Living Aids, Inc.](#), 183 F.3d 1334 (Fed. Cir. 1999), "This court has held that the language of the claims, the specification and the prosecution history are principally involved in con-

struing patent claims [\*4] because these constitute the public record." [Id.](#) at 1340. The patent claims, specifications, and prosecution history are known as intrinsic evidence and should be the primary forms of evidence upon which the Court relies for purposes of claim construction. [Teleflex, Inc. v. Ficosa N. Am. Corp.](#), 299 F.3d 1313, 1324-25 (Fed. Cir. 2002) (citing [Vitronics Corp. v. Conceptronic Inc.](#) 90 F.3d 1576, 1582 (Fed. Cir. 1996)) (stating that such evidence is "the most significant source of the legally operative meaning of the disputed claim language"). In addition, "prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence." [Kumar v. Ovonic Battery Co., Inc.](#), 351 F.3d 1364, 1368 (Fed. Cir. 2003).

To determine the meaning of the claim terms, the Court must begin with the words of the claims themselves. [Teleflex](#), 299 F.3d at 1324. "The language of the claim frames and ultimately resolves all issues of claim interpretation." [Abtox, Inc. v. Exitron Corp.](#), 122 F.3d 1019, 1023 (Fed. Cir. 1997). Courts look first to the dictionary definition of a contested [\*5] term to determine its meaning. [Kumar](#), 351 F.3d at 1367. Unless the specifications or prosecution history indicate otherwise, claim terms should be given the ordinary meaning that a person of ordinary skill in the art would ascribe to them. [Teleflex](#), 299 F.3d at 1325; [Texas Digital Sys., Inc. v. Telegenix, Inc.](#), 308 F.3d 1193, 1204-1205 (Fed. Cir. 2002). Courts must always first attempt to discern the ordinary and customary meaning of the claim words themselves before consulting the written description and prosecution history. [Id.](#) at 1205. Generally, the specifications and prosecution history in the intrinsic record may not further limit the claims beyond the limitations contained in the claims themselves. [Teleflex](#), 299 F.3d at 1326 (citing [Markman](#), 52 F.3d at 979, and cautioning that "claims must be read in view of the specification,...but limitations from the specification are not to be read into the claims"). Courts may not simply import characteristics of a disclosed or preferred embodiment into the meaning of claim terms. [Texas Digital Sys.](#), 308 F.3d at 1204. [\*6]

Courts must, however, examine claim terms within the context of the specifications to determine whether it appears that the inventor intended to impart novel meanings to the claim terms by deviating from ordinary definitions. [Teleflex](#), 299 F.3d at 1324. If the claim language is unclear on its face, then the Court may consider the specifications and the prosecution history to resolve the lack of clarity. [Id.](#) at 1324-25; [Interactive Gift Express, Inc. v. CompuServe, Inc.](#), 256 F.3d 1323, 1331 (Fed. Cir. 2001). "The intrinsic record may show that the specification uses the words in a manner clearly inconsistent with the ordinary meaning reflected, for example, in a dictionary definition. In such a case, the inconsistent dic-



tionary definition must be rejected." [Texas Digital Sys., 308 F.3d at 1204](#). The presumption in favor of a dictionary definition will be overcome where the patentee, acting as his or her own lexicographer, has clearly set forth an explicit definition of the term different from its ordinary meaning. *Id.* The presumption will also be rebutted if the inventor has disavowed or disclaimed scope of coverage [\*7] by using words or expressions of manifest exclusion or restriction, representing a clear disavowal of the claim. *Id.* In addition, claims may be limited by disclaimers or disavowals the inventor represented to the Patent and Trademark Office ("PTO") during the patent application process demonstrating an intent to deviate from the term's ordinary and accustomed meaning. See [Teleflex, 299 F.3d at 1326](#) ("Prosecution history...limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance.") (internal quotation marks and citation omitted); see also [Ecolab, Inc. v. Envirochem, Inc., 264 F.3d 1358, 1368 \(Fed. Cir. 2001\)](#). However, even though the claims are interpreted "in view of" the specification and prosecution history, the "focus must be on the claims." [Teleflex, 299 F.3d at 1326](#); see also [Interactive Gift, 256 F.3d at 1323](#) ("In construing claims, the analytical focus must begin and remain centered in the language of the claims themselves.").

In addition to intrinsic evidence, the Court may, when necessary, look [\*8] to extrinsic evidence to construe patent claims. Extrinsic evidence consists of treatises, expert testimony, inventor testimony, and prior art not cited in the prosecution history, and may be used to assist with claim construction when the intrinsic evidence is insufficient to establish the clear meaning of the asserted claim, so long as the extrinsic evidence does not contradict the claim language. See [Vitronics, 90 F.3d at 1582-84](#); [Altiris, Inc. v. Symantec Corp., 318 F.3d 1363, 1369 \(Fed. Cir. 2003\)](#).

## II. Discussion

### A. Claims

#### 1. '370 Patent

The claims asserted under the ['370 patent](#) are as follows:

Claim 1: A method of washing fabric in a washer having a wash chamber rotatable about a horizontal axis comprising the steps:

- rotating said wash chamber about its horizontal axis with fabric therein at a spin speed to effect less than a one gravity

centrifugal force on said fabric such that said fabric will tumble in said wash chamber;

- directing a recirculating spray of concentrated detergent solution having a concentration level in the range of 0.5 to 12% detergent by weight onto said fabric for a first period [\*9] of time as said fabric is tumbling in said wash chamber;
- after said first period of time, diluting said concentrated detergent solution to a lesser detergent concentration level, no less than 0.28 % byweight, and spinning said wash chamber to effect less than a one gravity centrifugal force on said fabric such that said fabric will again tumble in said wash chamber;
- directing a recirculating spray of said lesser concentrated detergent solution onto said fabric for a second period of time as said fabric is tumbling in said wash chamber; and
- draining said lesser concentrated detergent solution from said wash chamber subsequent to said second period of time.

Claim 2: A method of washing fabric according to claim 1, wherein said concentrated detergent solution is mixed prior to being directed onto such fabric.

Claim 3: A method of washing fabric according to claim 1, wherein said detergent solution is diluted after said first period of time by adding fresh water to said detergent solution.

Claim 4: A method of washing fabric according to claim 1, wherein prior to draining said lesser concentrated detergent solution from said wash chamber, fresh water [\*10] is added to cool such fabric.

Claim 8: A method of washing fabric in a washer having a wash chamber rotatable about a horizontal axis comprising the steps:

- loading fabric to be washed into the wash chamber of said washer;
- rotating said wash chamber about its horizontal axis with fabric therein at a spin speed to effect less than a one gravity centrifugal force on said fabric such that said fabric will tumble in said wash chamber;

- introducing concentrated detergent solution having a concentration level in the range of 0.5 to 12% detergent by weight onto said fabric as said fabric is tumbling in said wash chamber;
- sensing an amount of concentrated detergent solution being released from said tumbling fabric and terminating the introduction of concentrated detergent solution into said wash chamber just after said fabric has reached a full saturation level at said spin speed;
- directing a recirculating spray of concentrated detergent solution onto said fabric for a first period of time as said fabric is tumbling in said wash chamber;
- after said first period of time, diluting said concentrated detergent solution with water to a lesser detergent level, no less than [\*11] 0.28% by weight, and spinning said wash chamber to effect less than a one gravity centrifugal force on said fabric such that said fabric will again tumble in said wash chamber;
- directing a recirculating spray of said lesser concentrated detergent solution onto said fabric for a second period of time as said fabric is tumbling in said wash chamber; and
- draining said lesser concentrated detergent solution from said wash chamber subsequent to said second period of time.

Claim 9: A method of washing fabric according to claim 8, wherein said concentrated detergent solution is mixed prior to being directed onto said fabric.

Claim 10: A method of washing fabric according to claim 8, wherein said detergent solution is diluted after said first period of time by adding fresh water to said detergent solution.

Claim 11: A method of washing fabric according to claim 8, wherein prior to draining said lesser concentrated detergent solution from said wash chamber, fresh water is added to cool said fabric.

Claim 15: A method of washing fabric in a washer having a wash chamber rotatable about a horizontal axis comprising the steps:

- loading fabric to be washed [\*12] into the wash chamber of said washer;
- rotating said wash chamber about its horizontal axis with fabric therein at a spin speed to effect less than a one gravity centrifugal force on said fabric such that said fabric will tumble in said wash chamber;
- introducing concentrated detergent solution having a concentration level in the range of 0.5 to 12% detergent by weight onto said fabric as said fabric is tumbling in said wash chamber;
- sensing an amount of concentrated detergent solution being released from said tumbling fabric and terminating the introduction of concentrated detergent solution into said wash chamber just after said fabric has reached a full saturation level at said spin speed;
- directing a recirculating spray of concentrated detergent solution onto said fabric for a first period of time as said fabric is tumbling in said wash chamber;
- after said first period of time, diluting said concentrated detergent solution with water to a lesser detergent concentration level, no less than 0.28% by weight, and spinning said wash chamber to effect less than a one gravity centrifugal force on said fabric such that said fabric will again tumble in said wash chamber;
- [\*13] directing a recirculating spray of said lesser concentrated detergent solution onto said fabric for a second period of time as said fabric is tumbling in said wash chamber;
- draining said lesser concentrated detergent solution from said wash chamber subsequent to said second period of time;
- rinsing said fabric by adding water to wash chamber; and
- spinning said wash chamber to effect removal of said rinse water.

Claim 16: A method of washing fabric according to claim 15, wherein said concentrated detergent solution is mixed prior to being directed onto said fabric.

Claim 17: A method of washing fabric according to claim 15, wherein said rinse water is recirculated through said fabric while said fabric is caused to tumble in

said wash chamber for a third period of time.

## 2. '718 Patent

The claims asserted under the '718 patent are as follows:

Claim 1: A method of rinsing fabric in a washer having a wash chamber rotatable about a horizontal axis comprising the steps:

- (a) loading fabric to be washed into the wash chamber of said washer;
- (b) washing said fabric in a concentrated detergent solution of at least 0.5 % detergent by weight [\*14] while rotating said wash chamber about said horizontal axis for a first period of time;
- (c) draining said concentrated detergent solution from said wash chamber subsequent to said first period of time while spinning said wash chamber at a speed to effect more than a one gravity centrifugal force on said fabric such that said fabric will not tumble within said wash chamber as it spins;
- (d) rinsing said fabric by spraying water directly onto said fabric and recirculating water to said wash chamber by spraying said recirculating water directly onto said fabric while spinning said wash chamber at a speed to effect less than a one gravity centrifugal force on said fabric such that said fabric will tumble within said wash chamber as it spins;
- (e) draining said wash chamber of said rinse water while spinning said wash chamber at a speed to effect more than a one gravity centrifugal force on said fabric such that said fabric will not tumble within said wash chamber as it spins; and
- (f) repeating steps (d) and (e) a predetermined number of times.

Claim 5: A method of rinsing fabric in a washer according to claim 1 wherein fabric softener is mixed with said water in the last of [\*15] said rinsing steps.

Claim 6: A method of rinsing fabric washed in a concentrated detergent solution in a washer having a wash chamber rotatable about a horizontal axis comprising the steps of:

- (a) rinsing said fabric by adding water by spraying water directly onto said fabric and recirculating water by spraying water directly onto said fabric to and within said wash chamber while spinning said wash chamber at a speed to effect less than a one gravity centrifugal force on said fabric such that said fabric will tumble within said wash chamber as it spins;
- (b) draining said wash chamber of said rinse water; and
- (c) repeating steps (a) and (b) a predetermined number of times.

Claim 8: A method of rinsing fabric in a washer according to claim 6 wherein there [sic] no more than 12 of said rinsing and draining steps.

Claim 11: A method of rinsing fabric in a washer according to claim 6 wherein fabric softener is mixed with said water in the last of said rinsing steps.

Claim 12: The method of claim 6 wherein said step of draining further comprises spinning said wash chamber at a speed to effect more than a one gravity centrifugal force on said fabric [\*16] such that said fabric will not tumble within said wash chamber as it spins.

## B. Construction of Disputed Claim Terms

The two patents contain a total of seventeen claims (listed above), but many of the terms or phrases in dispute are used in the same or essentially the same way in multiple claims. The Court has attempted to consolidate the disputed terms and phrases into the categories discussed below.

### 1. Horizontal Axis

The construction of the term "*horizontal axis*" is in dispute. The term appears in the following context: "a wash chamber rotatable about a *horizontal axis*" and "rotating said wash chamber about its *horizontal axis*... such that said fabric will tumble in said wash chamber." ([370 patent](#), claims 1, 8, 15; '718 patent, claims 1, 6.)

Whirlpool argues that this terminology should be construed as follows: "These claim elements mean that the washer has a wash chamber that is rotated about an axis that is oriented primarily or predominantly parallel to the horizon such that the fabric will tumble when the wash chamber is rotated at a speed effecting less than

one gravity of centrifugal force on the fabric. This limitation encompasses a wash [\*17] chamber whose axis may be angled slightly (e.g., at 10 degrees), provided that the fabric will tumble when the wash chamber is rotated at a speed effecting less than one gravity of centrifugal force on the fabric."

LG argues for the following construction of this terminology: "A wash chamber rotatable about a horizontal (i.e., not angled or tilted) axis of the wash chamber...to cause fabric to tumble in the wash chamber."

The dispute here is over whether the term horizontal axis in the claims means that the washer's axis of rotation be predominantly or substantially horizontal, as Whirlpool contends, or strictly and absolutely horizontal, as LG would require. The Federal Circuit has held that the ordinary and accustomed meaning of a disputed claim term is presumed to be the correct one unless a different meaning is clearly set forth in the intrinsic materials, that is, the patent specification or prosecution history. [K-2 Corp. v. Salomon S.A.](#), 191 F.3d 1356, 1362-63 (Fed. Cir. 1999). Dictionary definitions provide evidence of a claim term's ordinary meaning. [Abbott Labs. v. Syntro Research, Inc.](#), 334 F.3d 1343, 1350 (Fed. Cir. 2003).

Whirlpool [\*18] submits a dictionary definition that it says makes clear that the term horizontal axis requires only a direction that is predominantly horizontal and includes an axis that is angled or tilted slightly, such as at a 10 degree angle. See WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY (horizontal can mean "of, relating to, or situated near the horizon," or "placed or operating chiefly along a plane parallel to the horizon"). The Court also notes a definition of horizontal in the OXFORD ENGLISH DICTIONARY: "applied to various mechanical contrivances, or artificial structures, of which the whole or the main part lies in a horizontal direction."

LG offers various dictionary definitions supporting its strict construction of the term horizontal axis as not encompassing a wash chamber rotating about any axis that is not at a right angle to the vertical line, such as one rotating on a tilted axis. See THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (horizontal means "in the plane of the horizon" or "at right angles to a vertical line"); id. (axis means a "straight line about which a body or geometric object rotates or may be conceived to rotate"); WEBSTER'S THIRD NEW INTERNATIONAL [\*19] DICTIONARY (horizontal means "parallel to the horizon: being on a level" or "measured or contained in a plane of the horizon"). Referring to one of Whirlpool's proffered definitions, LG argues that even an object operating "chiefly" along a plane parallel to the horizon must be on that plane a majority of the time, whereas a

tilted axis is *never* operating along a plane parallel to the horizon.

The Court concludes that the dictionary definitions do not conclusively favor either side's view of the plain and ordinary meaning of the term horizontal. Some definitions favor LG's strict interpretation, while others tend to comport with Whirlpool's looser construction. In accordance with the Federal Circuit's direction, this Court concludes that the ordinary meaning of horizontal based on dictionary definitions encompasses both alternatives. See [Inverness Med. Switzerland GmbH v. Warner Lambert Co.](#), 309 F.3d 1373, 1378-79 (Fed. Cir. 2002) ("Here there are two possibly pertinent definitions....In such situations, a word that has an ordinary meaning encompassing two relevant alternatives may be construed to encompass both alternatives."); [Texas Digital Sys., Inc. v. Telegenix, Inc.](#), 308 F.3d 1193, 1203 (Fed. Cir. 2002) [\*20] ("If more than one dictionary definition is consistent with the use of the words in the intrinsic record, the claim terms may be construed to encompass all such consistent meanings.").

In the face of multiple dictionary definitions, intrinsic evidence "is the most reliable guide to help the court determine which of the possible meanings of the terms in question was intended by the inventor to particularly point out and distinctly claim the invention." [Texas Digital](#), 308 F.3d at 1203. The intrinsic evidence in this case confirms that the term horizontal axis should be construed as Whirlpool suggests. Prior art cited in the patent specification or the prosecution history constitutes intrinsic evidence. [Kumar](#), 351 F.3d at 1368. During prosecution of the patents in suit, the applicants cited and described [U.S. Patent Nos. 4,489,455](#), (Whirlpool Br. Ex. 4), and 4,489,574, (Whirlpool Br. Ex. 5), (collectively, "the Spendel patents"), as prior art disclosing horizontal axis washing machines. ([370 patent](#), col. 1, lines 29-34.) The Spendel patents describe two types of washing machines, top loading and front loading: "The conventional method of washing textiles [\*21] in an automatic home-type washing machine in the United States is carried out in either a top loading or front loading machine. The difference between the two machines is that in a top loader the wash basket is rotatable around a substantially vertical axis and in a front loader the wash basket is rotatable around a *substantially horizontal axis*." (Whirlpool Br. Ex. 4., col. 1., lines 27-34; Ex. 5, col. 1, lines 26-33.) (emphasis added) The applicants also cited Australian Patent No. 209,436 to Johnston ("the Johnston patent"), (Whirlpool Br. Ex. 7), as prior art disclosing a "horizontal axis washing machine." The Johnston patent discloses a "tumbler type washer" in which a basket rotates "about a generally horizontal axis" or, in other words, "an axis inclined substantially from the vertical." (Whirlpool Ex. 7, at 12.) These examples of prior art



discussed in the prosecution history show that the term horizontal axis, when used to describe front loading washing machines, includes wash baskets with a generally or substantially horizontal orientation. LG argues that Whirlpool could have used qualifiers such as "generally" or "substantially" in its claims, but the Court finds that [\*22] these terms were unnecessary when they were already subsumed within the ordinary meaning of the word horizontal.

LG points out that during the prosecution, Whirlpool stated that "many attempts, as demonstrated in the patent art, have been made to obtain the advantages of both horizontal and vertical axis machines through the use of a tilted axis." (Response to Second Office Action at 8889, LG Br. Ex. 7.) But Whirlpool also stated that "these references are directed to two different types of processes, a horizontal wash process and a vertical wash process, which one of ordinary skill in the art would not find obvious to combine." (Id. at 8888.) More importantly, Whirlpool never distinguished the prior art tilted-axis machine on the basis of an exactly horizontal axis, nor did Whirlpool limit the term horizontal axis to mean absolutely perpendicular to vertical. See [Schwing GmbH v. Putzmeister Aktiengesellschaft](#), 305 F.3d 1318, 1324 (Fed. Cir. 2002) ("Although prosecution history can be a useful tool for interpreting claim terms, it cannot be used to limit the scope of a claim unless the applicant took a position before the PTO that would lead a competitor to believe [\*23] that the applicant had disavowed coverage of the relevant subject matter."); [ACTV, Inc. v. Walt Disney Co.](#), 346 F.3d 1082, 1091 (Fed. Cir. 2003) (explaining that claim terms should not be limited unless the "patentee intended to deviate from a term's ordinary and customary meaning or...the patentee disclaimed or disavowed subject matter, narrowing the scope of the claim's terms," which requires that the patentee either "has clearly set forth a definition of the term different from its ordinary and customary meaning," or has used "words or expressions of manifest exclusion or restriction."). The Court finds nothing in the intrinsic evidence that would put the public on notice that Whirlpool sought to limit the meaning of horizontal from its broader ordinary and customary meaning.

Perhaps most importantly, ascertaining the meaning of horizontal axis requires reading the claim terms in context: "rotating said wash chamber about its *horizontal axis* with fabric therein at a spin speed to effect less than a one gravity centrifugal force on said fabric *such that said fabric will tumble* in said wash chamber." (emphasis added) This sentence as a whole, along with the [\*24] prosecution history's discussion of the differences between horizontal and vertical machines, reveals that the distinguishing characteristic of a horizontal machine is that the fabric tumbles when it rotates at less than one

gravity. Tumbling will occur regardless of whether the axis of rotation is perfectly horizontal or somewhat inclined, in contrast to a vertical or generally vertical machine, where the clothes stay on the bottom.

Accordingly, the Court adopts Whirlpool's proposed construction of the term horizontal axis.

## **2. Directing a Recirculating Spray...Onto Fabric...In Said Wash Chamber**

The construction of the phrase "*directing a recirculating spray...onto fabric...in said wash chamber*" is in dispute. This phrase appears in the following contexts: "*directing a recirculating spray* of concentrated detergent solution having a concentration level in the range of 0.5 to 12% detergent by weight *onto said fabric* for a first period of time as said fabric is tumbling *in said wash chamber*" and "*directing a recirculating spray* of said lesser concentrated detergent solution *onto said fabric* for a second period of time as said fabric is tumbling." (['370 patent](#), [\*25] claims 1, 8, 15.)

Whirlpool argues for the following construction: "This limitation does not preclude other actions on the fabric from also taking place in the wash chamber during the first period of time, i.e., it does not preclude the fabric from also tumbling through a pool of detergent solution in the wash chamber."

LG seeks the following construction: "Directing a recirculating spray onto fabric in a wash chamber that does not contain a pool of detergent solution."

The parties do not dispute the definitions of the words in this claim limitation. Rather, the issue of disagreement is whether the claims preclude the presence of a detergent solution pooled in the bottom portion of the wash chamber. LG argues that the claim language excludes a process whereby fabric tumbles through a pool of detergent solution (and therefore its process, which includes fabric tumbling through a pool, cannot infringe). To this, Whirlpool responds that just because the claim speaks of spraying recirculating solution while the fabric is tumbling in the wash chamber does not mean that the claim limitation precludes other actions on the fabric - such as tumbling through a pool of detergent solution - [\*26] from also taking place during the same period of time.

It is well established that open ended method claims can cover methods that include additional, unrecited, unclaimed steps. See, e.g., [Medichem, S.A. v. Rolabo, S.L.](#), 353 F.3d 928, 933 (Fed. Cir. 2003) ("The transition 'comprising' in a method claim indicates that the claim is open-ended and allows for additional steps.") (internal quotation marks and citation omitted). Where, as here, the claim limitation is written in an open ended format using the words "comprising a recirculating spray," an



accused method can perform additional steps and still infringe. Given this language in the claim, the claim cannot be avoided simply by the addition of another step to the process.

LG acknowledges these principles but argues that during patent prosecution, Whirlpool disavowed a claim scope that would include clothes tumbling through a pool of detergent solution. Thus, LG contends, Whirlpool is no longer entitled to a construction of the claim that would include such a method, even if the claim itself would seem to endorse the construction Whirlpool seeks.

Claim construction can depart from the plain meaning of a claim [\*27] if there is a clear disavowal of claim scope in the specification. [Teleflex, Inc. v. Ficosa N. Am. Corp.](#), 299 F.3d 1313, 1326 (Fed. Cir. 2002). "Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question." [SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.](#), 242 F.3d 1337, 1341 (Fed. Cir. 2001); [Cultor Corp. v. A.E. Staley Mfg. Co.](#), 224 F.3d 1328, 1331 (Fed. Cir. 2000) ("Claims are not correctly construed to cover what was expressly disclaimed."). However, a "basic claim construction canon is that one may not read a limitation into a claim from the written description." [RF Delaware, Inc. v. Pacific Keystone Techs., Inc.](#), 326 F.3d 1255, 1264 (Fed. Cir. 2003). In order to overcome the "heavy presumption" afforded to the plain meaning of claim terms, the specification must evidence a clear disclaimer or a manifest exclusion. See, e.g., [Liebel-Flarsheim Co. v. Medrad, Inc.](#), 358 F.3d 898, 906-907 (Fed. Cir. 2004). [\*28] "Absent a clear disclaimer of particular subject matter, the fact that the inventor may have anticipated that the invention would be used in a particular way does not mean that the scope of the patent is limited to that context." [Northrop Grumman Corp. v. Intel Corp.](#), 325 F.3d 1346, 1355 (Fed. Cir. 2003).

In addition to the specification, a disclaimer or disavowal may arise from the prosecution history. See [Standard Oil Co. v. American Cyanamid Co.](#), 774 F.2d 448, 452 (Fed. Cir. 1985) ("the prosecution history...limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance").

In this case, LG contends that Whirlpool expressly disparaged and disclaimed the washing method of tumbling fabric in a pool of detergent solution because that process inhibited efficient use of water and energy. First, LG points to the background portion of the ['370 patent](#),

which announces that one of the objects of the claimed wash method was to approximate "'traditional' cleaning levels, yet reduce the energy and water usage." (['370 patent](#), col. 1, lines 67-68.) Some of [\*29] those "traditional" methods from which the ['370 patent](#) purports to differ involved a fabric load that was "tumbled in the presence of the wash fluid for a given period of time" or where a "tumbling agitation of the clothes" occurs in a tub either half full of water and concentrated detergent or full of water and diluted detergent. (Id. at col. 1, lines 29-50.) However, these objects or goals of the invention do not necessarily limit the claims: "The court's task is not to limit claim language to exclude particular devices because they do not serve a perceived 'purpose' of the invention.... An invention may possess a number of advantages or purposes, and there is no requirement that every claim directed to that invention be limited to encompass all of them." [E-Pass Techs., Inc. v. 3Com Corp.](#), 343 F.3d 1364, 1370-71 (Fed. Cir. 2003) (vacating district court's claim construction for limiting claims "in light of the perceived purpose served by the invention"): [Raytheon Co. v. Roper Corp.](#), 724 F.2d 951, 958 (Fed. Cir. 1983) ("requiring that all claims must set forth inventions satisfying all objectives [stated in the patent] would make no sense"). [\*30] On the other hand, E-Pass Technologies acknowledged that "where claim language is ambiguous, the purpose of the invention described in the specification may, of course, sometimes be useful in resolving the ambiguity." 343 F.3d at 1370 n.4 (citing [Apple Computer, Inc. v. Articulate Sys., Inc.](#), 234 F.3d 14, 25 (Fed. Cir. 2000)).

Next, LG maintains that the preferred embodiment of the ['370 patent](#) further reveals Whirlpool's disclaimer of tumbling clothes in a pool of solution. The preferred embodiment states: "Water level control is critical. Too much detergent solution added will create an over sudsing condition by allowing the spinning basket to contact detergent solution in the bottom of the tub. The preferred method of control is to maintain a minimum level of detergent liquor in the bottom of the tub through the water level sensor." (['370 patent](#), col. 6, lines. 8-11.) The preferred embodiment continues: "Accumulation of concentrated detergent liquor in areas other than the orifice to the pump, such as between the tub and the basket, increases the risk of the spinning/tumbling basket contacting the liquor and mechanically aerating it to the point [\*31] which negatively affects recirculated spray flow patterns and remaining detergent liquor throughout the recirculation plumbing." (['370 patent](#), col. 7, lines 52-59.)

These passages could be understood to suggest that the preferred embodiment comprises a method whereby the fabric does not tumble through a pool of detergent solution. But the Court does not read the preferred em-

bodiment to state a clear disclaimer or manifest exclusion of a claim scope permitting clothes to tumble through a pool of detergent solution. As the patent states, the method of water level control in the preferred embodiment is only "the preferred method of control." ([370 patent](#), col. 6, lines 11-12.) Nowhere does the [370 patent](#) expressly disavow tumbling fabric through a pool. What is more, the Federal Circuit has clarified that describing an embodiment - even a preferred embodiment - does not create a claim limitation. See, e.g., [RF Delaware, Inc., 326 F.3d at 1263-64](#) (explaining that "claims are not necessarily and not usually limited in scope simply to the preferred embodiment" and emphasizing that "[a] basic claim construction canon is that one may not read a limitation into a claim [\*32] from the written description"); [Teleflex, 299 F.3d at 1326](#) ("Ficosa argues that where only one embodiment is disclosed in the specification, claim terms are limited to the embodiment disclosed....A review of [Federal Circuit cases] demonstrates that our precedent establishes no such rule."); [Id. at 1327](#) (explaining that an accused infringer cannot overcome the "heavy presumption" that a claim term takes on its ordinary meaning simply by pointing to the preferred embodiment or other structures or steps disclosed in the specification or prosecution history); [Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 906 \(Fed. Cir. 2004\)](#) ("this court has expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment").

LG next cites the discussion of prior art in the prosecution history as evidence that Whirlpool disclaimed the pooling method. "Explicit arguments made during prosecution to overcome prior art can lead to narrow claim interpretations... By distinguishing the claimed invention over the prior art, an applicant is indicating [\*33] what the claims do not cover." [Lampi Corp. v. American Power Prods., Inc., 228 F.3d 1365, 1374 \(Fed. Cir. 2000\)](#) (internal quotation marks and citation omitted). In *Lampi*, the court found a claim limitation because during prosecution, "the patentee made unambiguous statements relinquishing" a method. *Id.*

Whirlpool's response to inquiries from the patent examiner explained how its invention differed from the prior art, asserting that "the present invention is directed to a novel, water saving method of washing clothes" and "the present invention attempts to optimize the mechanical effects of a small wash liquid without imparting damaging mechanical action between the clothes." (Response to Second Office Action at 3, 4, Whirlpool Br. Ex. 12.) The "rinse method" of the '718 patent was likewise "intended to minimize the amount of water and mechanical energy used as well as limiting the duration of the rinse cycle." (Amendment at 9006, LG Br. Ex. 8.)

LG discusses how Whirlpool sought to distinguish its invention from the prior art Johnston and Brenner patents. Whirlpool claimed that its wash process was "radically different from" the processes taught by these patents. [\*34] (Response to First Office Action, at 1.) Whirlpool characterized the Johnston system as teaching the "use of a horizontal axis washer, tumbling clothes and repeatedly dropping them in a pool of detergent solution by adding additional water and subsequently tumbling the clothes through this diluted wash liquor." (*Id.* at 2.) Its invention differed from Johnson, Whirlpool argued, because "Johnson nowhere suggests the spraying of the detergent solution onto the clothes, in either the concentrated wash or the dilute wash step, let alone in both, as claimed in all of the claims of the present invention." (*Id.*) Whirlpool then described Brenner as teaching the "use of a vertical axis washer, spinning clothes while spraying the concentrated wash liquor at and through the clothes, and agitating the clothes in a pool of diluted wash liquor." (*Id.*) Its invention differed from Brenner, Whirlpool said, because "Brenner nowhere teaches or suggests that this process is applicable to a horizontal axis washer. Brenner nowhere teaches or suggests spraying concentrated wash onto tumbling clothes, as required by each of the claims pending in the present invention. Brenner nowhere teaches or [\*35] suggests spraying diluted wash liquor into tumbling clothes, as is also required by each of the claims." (*Id.*) Whirlpool summarized that its invention was a "novel method of washing clothes in a horizontal axis washer wherein a concentrated detergent wash solution is sprayed onto tumbling clothes, this solution is then diluted, and then the diluted solution is sprayed onto tumbling clothes." (*Id.* at 1.) Whirlpool claimed that its invention differed from Johnston and Brenner because neither of those two patents "suggests either of the spraying steps of the present application, let alone the combination of these two spraying steps." (*Id.* at 2.) It is evident from these statements that Whirlpool viewed the distinguishing feature of its invention to be its spraying process.

The Court can find nothing in Whirlpool's communications with the patent examiner that disclaims a wash process whereby fabric tumbles through a pool of detergent solution. Whirlpool mentioned that Johnston and Brenner involved moving clothes through a pool of solution, but said that its invention differed from those patents, not because it excluded a pool, but because it involved spraying detergent solution [\*36] on the clothing. The only language that even comes close to supporting LG's position is Whirlpool's statement that its invention "attempts to optimize the mechanical effect of a small amount of wash liquor without imparting damaging mechanical action between the clothes." (Response to Second Office Action at 4, Whirlpool Br. Ex. 12.) That vague statement, whatever it means, certainly lacks the

clarity required for a disavowal or disclaimer of allowing fabric to tumble through a pool of solution.

LG argues that this case resembles [SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc.](#), 242 F.3d 1337 (Fed. Cir. 2001), where the Federal Circuit found a disclaimer of claim coverage based on language in the patent specification. First, SciMed cautioned that although courts may not read a limitation from the written description into the claims, the claims nonetheless must be read "in view of" and "in light of" the specification. [Id. at 1340-41](#). Among other things, the specification in SciMed discussed disadvantages of prior art inventions and expressly stated that the definition of the structure in the specification, which did not include [\*37] those disadvantageous features, comprised "all embodiments of the present invention contemplated and disclosed herein." [Id. at 1342-43](#). The court therefore read the specification as "leading to the inescapable conclusion" that the patentee intended to limit the claim. [Id. at 1342](#). In fact, the court found it "difficult to imagine how the patents could have been clearer" in making the disclaimer. [Id. at 1344](#). The court held that when "the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent." [Id. at 1341](#).

As explained above, no similarly clear disclaimer or manifest exclusion of tumbling through a pool of solution is evident in the specification or prosecution history of this case. See [Teleflex](#), 299 F.3d at 1327 (claim construction can only depart from the plain meaning of the claim terms through "words or expressions of manifest exclusion or restriction that represent a clear disavowal of claim scope"); see also [Lieberman v. Florsheim Co.](#), 358 F.3d 898, 906 (Fed. Cir. 2004) [\*38] (declining to apply SciMed because the patents at issue lacked a "clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction'" (internal quotation marks and citation omitted); [Honeywell, Inc. v. Victor Co. of Japan, Ltd.](#), 298 F.3d 1317, 1325-26 (Fed. Cir. 2002) (declining to apply SciMed and holding that absent a clear disclaimer of claim scope, disadvantages of the prior art, as discussed by the specifications of any patents-in-suit, cannot limit claim scope).

Accordingly, the Court sides with Whirlpool and construes the phrase "directing a recirculating spray...onto fabric...in said wash chamber" as not precluding the fabric from also tumbling through a pool of detergent solution in the wash chamber.

### 3. A Concentration Level

The construction of the phrase "*a concentration level*" is in dispute. This language appears in the following contexts: "directing a recirculating spray of concen-

trated detergent solution having *a concentration level* in the range of 0.5 to 12% detergent by weight onto said fabric for a first period of time as said fabric is tumbling in said wash chamber"; "directing a recirculating [\*39] spray of *said lesser concentrated* detergent solution onto said fabric for a second period of time"; and "a concentrated detergent solution." ([370 patent](#), claims 1, 8, 15; '718 patent, claim 1.)

Whirlpool argues that the wording "having a concentration level in the range of 0.5 to 12% detergent by weight" should be construed as follows: "This claim limitation means that the detergent solution may have a varying concentration level, i.e., in the range of 0.5 to 12% by weight, during the first time period. The concentration level of the detergent solution may also, but is not required to, remain at a fixed level." Further, the phrase "said lesser concentrated detergent solution" should be construed to mean: "The detergent concentration level may vary or remain at a fixed level during the second period of time, but must remain no less than 0.28 % detergent by weight."

LG argues for the following construction: "Concentrated detergent having a fixed concentration level in the range of 0.5 to 12% by weight" and "concentrated detergent solution having a fixed, lesser detergent concentration level."

The dispute pertains to whether the indefinite article "a" modifying "concentration [\*40] level" means the solution concentration must be at a fixed level, or whether it may vary within the stated boundaries. Whirlpool contends that construing "a" as non-limiting and permitting a range of concentration levels accords with the ordinary meaning of the word, simple English sentence structure, and applicable precedent. According to the Federal Circuit: "This court has repeatedly emphasized that an indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.' Unless the claim is specific as to the number of elements, the article 'a' receives a singular interpretation only in rare circumstances when the patentee evinces a clear intent to so limit the article." [Scanner Techs. Corp. v. ICOS Vision Sys. Corp.](#), 365 F.3d 1299, 1304 (Fed. Cir. 2004) (quoting [KCJ Corp v. Kinetic Concepts, Inc.](#), 223 F.3d 1351, 1356 (Fed. Cir. 2000)). The preamble to the claim in which this disputed phrase appears contains the open ended word "comprising," but the phrase itself uses the word "having" (i.e., "*having* a concentration level"). The Federal Circuit has held [\*41] that "having" may at times be construed as an open ended term as well. See, e.g., [Lampi Corp. v. Am. Power Prods. Inc.](#), 228 F.3d 1365, 1376 (Fed. Cir. 2000); [Regents of Univ. of Cal. v. Eli Lilly & Co.](#), 119 F.3d 1559, 1573 (Fed. Cir. 1997); [Crystal Semiconductor Corp. v. TriTech Microelectron-](#)

[ics Int'l. Inc., 246 F.3d 1336, 1348 \(Fed. Cir. 2001\)](#) (explaining that the transition word "having" can make a claim open, although the term does not convey the open-ended meaning as strongly as "comprising" and thus should be considered in context). Nothing in the ['370 patent](#), Whirlpool argues, evinces an intent to limit "a" to a singular interpretation. Whirlpool also notes that the specification discusses adding fresh water to the detergent solution during a wash cycle, (['370 patent](#), col. 6, lines 58-64: "Once the mixing tank 80 is emptied, fresh water is added through the detergent water valve 40, 42 and 76 as required by the water level sensor 140"), which necessarily means that the detergent concentration level varies.

LG counters that the indefinite article "a" should be construed to refer to detergent solutions with some fixed concentration [\*42] level. The intrinsic evidence, LG contends, requires restricting this claim term to a single level. See [KCI Corp. v. Kinetic Concepts, Inc., 223 F.3d 1351, 1356 \(Fed. Cir. 2000\)](#) ("When claim language or context suggest an ambiguity in application of the general meaning of an article, this court undertakes an examination of the written description and the prosecution history to ascertain whether to limit the meaning of 'a' or 'an.'"). The Federal Circuit looked to the claim language, specification, and prosecution to determine that the term "a metallic gas-confining chamber" had to be construed as limited to a single chamber in [AbTox, Inc. v. Exitron Corp., 122 F.3d 1019, 1023-24 \(Fed. Cir. 1997\)](#), modified in part, [131 F.3d 1009, 1010 \(Fed. Cir. 1997\)](#). The court relied on the fact that the specification contained repeated references to "said chamber." LG points out that in this case, the claim at various points discusses "said concentrated detergent solution" and "said lesser concentrated detergent solution." Based on AbTox, LG contends, the use of the word "said" in this case requires construing the claim to mean a single, fixed [\*43] concentration level. The Court rejects this reasoning because "said" clearly modifies the term "solution," not "concentration level." In fact, the claims nowhere use the phrase "said concentration level."

LG next argues although "a" can mean "one or more," it can also receive a singular interpretation when the patentee evinces a clear intent to so limit the article. [Scanner Techs. Corp. v. ICOS Vision Sys. Corp., 365 F.3d 1299, 1304 \(Fed. Cir. 2004\)](#). The public record in this case, LG contends, reflects such an intent. LG says that the disclosed preferred embodiment uses only single, fixed concentration levels. However, the mixing tank embodiment is merely one embodiment, and the Court may not read a limitation onto the claim from the written description. [RF Delaware, Inc. v. Pacific Keystone Techs., Inc., 326 F.3d 1255, 1263 \(Fed. Cir. 2003\)](#); see also [Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898,](#)

[906 \(Fed. Cir. 2004\)](#) (claims will not be limited to the preferred embodiment absent "words or expressions of manifest exclusion or restriction" representing a clear intent to disavow claim scope). Moreover, as discussed above, the [\*44] patent in fact appears to embrace varying concentration levels through the addition of fresh water.

LG goes on to point out that Whirlpool's communications with the patent office recited "a" concentrated solution, which again LG says means a fixed concentration level. The Court has already rejected this limited construction of the word "a." Finally, LG maintains that Whirlpool could have drafted the claims with words such as "variable" or "varying" but did not because it meant for the claim to cover only fixed concentration levels. Once again, this misses the point; the claim is drafted with open-ended language in order to allow for a range of concentration levels. Cf. [Insituform Techs., Inc. v. Cat Contracting, Inc., 99 F.3d 1098, 1106 \(Fed. Cir. 1996\)](#) (restricting "a" to a singular interpretation because "the claim is specific as to the number of elements (one cup) and adding elements eliminates an inherent feature (discontinuous vacuum) of the claim").

Accordingly, the Court adopts Whirlpool's construction of the phrase "a concentration level" as permitting varying concentration levels because there is no evidence of clear intent to limit the article.

#### 4. Period [\*45] of Time

The construction of the phrase "*period of time*" is in dispute. It appears in the following contexts: "directing a recirculating spray of concentrated detergent solution having a concentration level in the range of 0.5 to 12 % detergent by weight onto said fabric for a first *period of time*"; "after said first *period of time*, diluting said concentrated detergent solution to a lesser detergent concentration level, no less than 0.28 % by weight, and spinning said wash chamber to effect less than a one gravity centrifugal force on said fabric that said fabric will again tumble"; "after said first *period of time*"; "directing a recirculating spray of said lesser concentrated detergent onto said fabric for a second *period of time*"; "for a third *period of time*." (['370 patent](#), claims 1, 8, 15, 17; '718 patent, claim 1.)

Whirlpool seeks the following construction: "The first period of time may vary and is not limited to any predetermined or specified length of time. The end of the first time period is marked by a termination of the recirculating spray and the tumbling of the fabric." "The second period of time may vary and is not limited to any predetermined [\*46] or specified length of time." "The third period of time comes after the first and second periods of time. Nothing in this term requires the third time period to be of a particular or specified length of time."



Whirlpool would construe the term to encompass both fixed or predetermined lengths of time, as well as varying or unspecified lengths of time.

LG argues for the following construction: "for a first predetermined period of time (i.e., predetermined concentrated wash period)"; "after the first predetermined period of time (i.e., predetermined concentrated wash period)"; "for a second predetermined period of time (i.e., predetermined diluted wash period)"; and "for a third predetermined period of time."

The dispute centers on whether "period of time" means only a predetermined length of time, as LG argues, or can encompass both predetermined and variable lengths of time, as Whirlpool argues. Dictionary definitions of the word "period" support Whirlpool's position that the term is open ended. See NEW SHORTER OXFORD ENGLISH DICTIONARY ("period" is "a course or extent of time"); AMERICAN HERITAGE DICTIONARY ("period" is "an interval of time characterized by the occurrence of [\*47] a certain condition or event"). These definitions contain no requirement for a predetermined or fixed length of time. Furthermore, the Court discerns nothing in the phrases "first period of time," "second period of time," and "third period of time" that requires the periods to be of particular or specified lengths. The words "first," "second," and "third" appear to serve no function beyond distinguishing one step from the other. See 3M [Innovative Props. Co. v. Avery Dennison Corp.](#), 350 F.3d 1365, 1371 (Fed. Cir. 2003) ("In the context of claim 1, the use of the terms 'first...pattern' and 'second...pattern' is equivalent to a reference to 'pattern A' and 'pattern B,' and should not in and of itself impose a serial or temporal limitation onto claim 1.").

The ['370 patent](#) specification, LG argues, requires construing "period" to mean a predetermined time. In LG's view, the specification unambiguously discloses an automatic control system that chronologically cycles through preset or preselected steps whereby the recirculating spray of concentrated detergent solution is directed onto the fabric. The specification describes "a machine having a *presettable sequential* [\*48] control means for operating a washer through a *preselected* program of automatic washing, rinsing, and extracting operations" (['370 patent](#), col. 2, lines 58-61) (emphasis added); the patent explains that the washing steps occur as "a predetermined period" or "designated time" (['370 patent](#), col. 6, lines 52-57, 67-68; col. 8, lines 26-30). Also, the specification speaks of "some predetermined period of time specified by the cycle type." (['370 patent](#), col. 6, lines 52-53.) In the diluted wash step, "the type and length of tumbling action varies with the cycle desired"; for example, "maximum time may be selected for maximum soil removal, while lesser times offer less fluid flow and fabric flexing for delicates, silks, wools, sweat-

ers, and other fine washables." (['370 patent](#), col. 8, lines 27-30.) Thus, LG maintains, the specification indicates that the first, second, and third periods of time are predetermined periods dictated by the user's needs. LG also argues that during the patent prosecution, the examiner's discussion of the Johnston patent revealed the examiner's understanding of "period of time" to mean a predetermined period of time. (Australian Patent 209,436 at 6, LG Br. [\*49] Ex. 106 (discussing a "first period of time" and a "second period of time" and explaining that "the agitation and scrubbing of the fabrics in the low level, highly concentrated solution is carried out for about five minutes or until the segment 59 engages the contact finger 72."))

The Court agrees with LG that the specification indicates that the time periods' lengths depend upon the user's choices. For example, if the user selects maximum soil removal, then the period will be one preset length; if the user selects delicates, then the period will be preset for a shorter length. It is true, as Whirlpool notes, that the period of time varies with the cycle type, but once the cycle type is selected, the time is fixed. The preferred embodiment, however, is only one example of the claimed invention. As the Court has stressed elsewhere in this Opinion, the claims are not to be limited to the preferred embodiment in the absence of "words or expressions of manifest exclusion or restriction" representing a clear intent to disavow the claim's scope, none of which appear in the intrinsic evidence of this patent. [Liebel-Flarsheim Co. v. Medrad, Inc.](#), 358 F.3d 898, 906 (Fed. Cir. 2004). [\*50] Just because Whirlpool's preferred embodiment appears to feature preset time periods does not mean that the claims are necessarily so limited. In addition, the word "predetermined" appears in the claims themselves only in claims 1 and 6 of the '718 patent, which both describe "repeating steps (d) and (e) a predetermined number of times." This language pertains to the number of times the recirculation process is repeated, not the length of any "period," and thus has no bearing on the construction of the term "period."

Accordingly, the Court adopts Whirlpool's construction of the phrase "period of time" to include both fixed, predetermined lengths and open, unspecified lengths.

### 5. Diluting and Will Again Tumble

The construction of the phrase "*diluting...and spinning...such that said fabric will again tumble*" is in dispute. It appears in the following context: "after said first period of time, *diluting* said concentrated detergent solution to a lesser detergent concentration level, no less than 0.28 % by weight, *and spinning* said wash chamber to effect less than a one gravity centrifugal force on said fabric *such that said fabric will again tumble*" (['370 patent](#), [\*51] claims 1, 8, 15.)



Whirlpool argues for the following construction: "This claim step means that after the first period of time, the detergent solution is diluted to a lower detergent concentration level of at least 0.28 % by weight. Also, after the first period of time, the wash chamber must again be spun at a speed effecting less than one gravity of centrifugal force on the fabric such that the fabric 'will again tumble' in the wash chamber. This diluting claim step occurs at some point following the first period of time; therefore this step must occur after the recirculating spray and the tumbling action have stopped (i.e., actions which characterize the first period of time)."

LG argues for the following construction: "After the first predetermined period of time (i.e., predetermined concentrated wash period), diluting the concentrated detergent solution to a fixed, lesser detergent concentration level, no less than 0.28 % by weight, and spinning the wash chamber...to cause the fabric to tumble in a wash chamber. Dilution of the concentrated detergent solution is initiated as the result of the completion of the predetermined concentrated wash period (i.e., not as a result of maintaining [\*52] a predetermined liquid level in the wash chamber)."

The issue in dispute is whether the claim requires the tumbling action to stop between two steps. Whirlpool argues that the recirculating spray and tumbling action occurs in a first step, then stops during the dilution, and then resumes again in a second step. LG maintains that the claims permit the recirculating spray and tumbling action to continue uninterrupted, with no intermittent termination of wash chamber rotation. The Court can find nothing in the plain language of the claims requiring the tumbling to stop and start again. Whirlpool's dictionary definitions do not require the construction it seeks. The word "after" defined as "behind in place or order" or "at a later time than" contains no requirement for an interruption between two actions-it only requires that the one follow the other. See AMERICAN HERITAGE DICTIONARY. Likewise, "again" defined as "once more; a new" does not require an interruption. See AMERICAN HERITAGE DICTIONARY. The claim states that "after the first period of time," the fabric will "again tumble," which can be understood to mean that when the first period ends and the next step ensues, the [\*53] fabric continues tumbling without having stopped. n1 Neither does the word "then" separating two steps necessarily require a break in an action; a first step can occur, and then another step following it, without the tumbling action ceasing and restarting. n2

n1 Fabric can alternate between tumbling and not tumbling without a stop in the chamber's spinning. Fabric tumbles when the rotation is at

less than 1 gravity, while it sticks to the outside of the chamber when rotating at more than 1 gravity due to centrifugal force.

n2 Whirlpool illustrates its construction of the word "then" with the following example: "He stayed up late watching the movie, then went to bed." The person in Whirlpool's example watches a movie, stops, and then does something else. But the word "then" can readily be used in a context involving no stopping and starting, but rather an uninterrupted transition. For example, "He drove at 65 miles per hour, then drove at 55 miles per hour."

Whirlpool argues, and the Court agrees, that the [\*54] prosecution history discloses a process involving distinct steps. In response to the examiner, Whirlpool characterized its invention as involving "two distinct spraying steps," first, "a concentrated spray and tumble step," and second, "a diluted spray and tumble step." (Response to Second Office Action at 3, Whirlpool Br. Ex. 12.) This description evinces that the difference between the two steps is that in the first step the spray is concentrated, where as in the second step the spray is diluted. Nothing in this description, however, suggests that the tumbling must stop and restart between the steps, even if the chamber spins at different speeds at various times.

Accordingly, the Court adopts LG's construction that "diluting and tumbling again after the first period of time" does not require the tumbling to stop between steps. The claim includes a scenario where clothes continuously tumble without interruption.

## 6. Mixed Prior To

The construction of the phrase "*mixed prior to*" is in dispute. It appears in the following context: "said concentrated detergent solution is *mixed prior to* being directed onto said fabric." ([370 patent](#), claims 2, 9, 16.)

Whirlpool seeks [\*55] the following construction: "This claim element means that detergent and water are combined to form the concentrated detergent solution before the resulting solution is sprayed onto the fabric. There is no limitation or restriction as to the location where the mixing occurs, i.e., the mixing is not required to occur in a mixing tank or a zone separate from the fabric and the wash chamber."

LG seeks the following construction: "The concentrated detergent solution having a fixed concentration level in the range of 0.5 to 12% by weight is mixed in a zone separate from the fabric and the wash chamber prior to being directed onto the fabric in the wash chamber."

The dispute turns on whether the claim limits not only when the mixing occurs, but where. The plain, ordinary meaning of the claim language supports Whirlpool's position. The claim speaks of mixing the detergent solution prior to directing it onto the fabric; it says nothing about where the mixing must occur, whether it be inside the wash chamber or in a mixing tank or other separate location. Moreover, neither the ordinary meaning nor any dictionary definitions of "mix" embrace a locational requirement.

In spite of the unambiguous [\*56] meaning of the terms, LG argues that the patent specification discloses a requirement for the mixing to occur in a mixing tank. The Court rejects this argument for several reasons. First, although one embodiment discloses a mixing tank, that is not the only embodiment. ([370 patent](#), col. 3, lines 31-34 ("A mixing tank 80, as shown in FIG. 3, forms a zone for receiving and storing a concentrated solution of detergent during a wash cycle, and is used in some embodiments of the invention.") (emphasis added)) Second, the mixing tank embodiment is not the preferred embodiment. ([370 patent](#), col. 6, lines 35-36 ("In the preferred embodiment of the invention a mixing tank is not utilized.")) The fact that the word "mix" is used to describe events both inside and outside of a mixing tank shows that "mixing" can happen in both places.

Accordingly, the Court adopts Whirlpool's construction that the claim does not require mixing to occur in any particular location such as a separate mixing tank.

### 7. Introducing Onto

The meaning of the term "*introducing...onto*" is in dispute. It appears in the following context: "*introducing concentrated detergent solution having a concentration [\*57] level in the range of 0.5 to 12% by weight onto said fabric as said fabric is tumbling.*" ([370 patent](#), claims 8,15.)

Whirlpool seeks the following construction: "This claim step means that concentrated detergent solution in the range of 0.5 to 12% by weight is introduced into the wash chamber by directing the concentrated detergent solution onto (i.e., on top of) the fabric as the fabric is tumbling in the wash chamber."

LG argues for the following construction: "Introducing concentrated detergent solution... onto the fabric in a wash chamber that does not contain a pool of detergent solution as the fabric is tumbling in the wash chamber. Introducing onto said fabric is not limited to introducing solution to only the top of the fabric."

The dispute is whether "introducing solution onto fabric" requires that the solution originate at a point vertically above the fabric. Whirlpool argues that the ordinary meaning of "onto" means "on top of, upon,"

AMERICAN HERITAGE DICTIONARY and thus the claim requires that the solution be introduced from above the clothes. LG counters that a definition of "upon" is "used to indicate contact with or extent over (a surface) regardless of position, [\*58]" which suggests that the contact may occur from any direction. AMERICAN HERITAGE DICTIONARY. The Court finds the dictionary definitions ambiguous and that the ordinary meaning of "onto" does not require movement from top to bottom. For example, someone painting his living room ceiling would be "introducing" paint "onto" the ceiling, but of course would do so from bottom to top. Thus, the Court construes the terminology to encompass contact from any direction. See [Inverness Med. Switzerland v. Warner Lambert Co.](#), 309 F.3d 1373, 1379 (Fed. Cir. 2002) ("A word that has an ordinary meaning encompassing two relevant alternatives may be construed to encompass both alternatives.").

Accordingly, the Court adopts LG's proposed construction of "directing...solution...onto said fabric."

### 8. Sensing

The meaning of the term "*sensing*" is in dispute. It appears in the following context: "*sensing an amount of concentrated detergent being released from said tumbling fabric.*" ([370 patent](#), claims 8, 15.)

Whirlpool argues for the following construction: "This claim step means that the washer detects the level or amount of detergent solution in the washer, and perceives [\*59] a particular level or amount of detergent solution as an indication that the fabric is (or is not) fully saturated with detergent solution. Sensing may occur regardless of whether there is pooling of detergent solution in the wash chamber."

LG argues for the following construction: "Sensing an amount of concentrated detergent solution that is released from the tumbling fabric (i.e., not sensing the level of a pool of detergent solution in the wash chamber as the fabric tumbles)."

The dispute is not about the meaning of the term "sensing," but rather what is being sensed. According to LG, the word "sensing" must be understood in its context in the claim, which discusses "sensing an amount of concentrated solution *being released from said tumbling fabric.*" (emphasis added) In LG's device, the detergent solution is located in a pool that reaches above the lower portion of the spin drum containing the clothes. Thus, the fabric never "releases" solution, making it impossible to "sense" the "amount of...solution being released." This system, LG argues, contrasts with Whirlpool's disclosed systems which keep the water level below the wash chamber and enable the machine to "sense" the [\*60]

amount of solution that drips down (i.e., is "released") from the clothes into the pool.

Whirlpool argues that LG is attempting to read a negative limitation into the claim based upon how a Whirlpool machine may work, when no such limitation arises from the claim itself. See [RF Delaware, Inc. v. Pacific Keystone Techs., Inc.](#), 326 F.3d 1255, 1263 (Fed. Cir. 2002) (a basic claim construction canon is that one may not read an unstated limitation into a claim).

The Court disagrees with Whirlpool because regardless of the specification, prosecution history, or how Whirlpool's machines may operate, the claim language supports only LG's construction. The claim does not, as Whirlpool would now have it, describe sensing an amount of solution *in the wash chamber*. Rather, it requires sensing the amount of solution *released from the fabric*. It defies both the ordinary meaning of "release" and common sense to suggest that clothes sitting in a pool of solution can at the same time "release" an amount of solution that can then be "sensed." The only logical view of the claim is that it requires a method whereby the clothes are elevated above the pool of solution, the level [\*61] of which can be measured (i.e., "sensed") to determine how much solution drips down from (i.e., is "released" from) the clothes. Whirlpool's proposed construction would impermissibly read the phrase "released from said tumbling fabric" out of the claim. See [Apple Computer, Inc. v. Articulate Sys., Inc.](#), 234 F.3d 14, 25 (Fed. Cir. 2000) (rejecting interpretation of language in a claim so broadly as to read the limitation out of the claim).

Accordingly, the Court adopts LG's proposed construction of the phrase "sensing an amount of concentrated detergent being released from said tumbling fabric."

### 9. Terminating...Just After...Full Saturation

The meaning of the word "terminating" is in dispute. It appears in the following context: "*terminating* the introduction of concentrated detergent solution into said wash chamber just after said fabric has reached a full saturation level at said spin speed." (['370 patent](#), claims 8, 15.)

Whirlpool seeks the following construction: "This claim step means that the introduction of concentrated detergent solution into the wash chamber is stopped shortly after the fabric reaches a full saturation level at the spin speed. Full [\*62] saturation at the spin speed means that the fabric has absorbed an amount of detergent solution to come to equilibrium with respect to detergent solution retention at the particular spin speed. There is no requirement that the introduction is terminated for any particular reason."

LG argues for the following construction: "Terminating the introduction of concentrated detergent solution (i.e., not fresh water) into the wash chamber just after sensing that the fabric in the wash chamber has reached a full saturation level at the recited spin speed (i.e., not as a result of maintaining a predetermined liquid level in the wash chamber).

LG does not dispute Whirlpool's interpretation of the phrase "just after full saturation" as meaning "shortly after" the fabric has reached a full saturation level at the recited spin speed. The issue is whether the claim contains the limitation that the termination not be the result of maintaining a predetermined liquid level in the wash chamber.

The Court agrees with Whirlpool that the claim does not include LG's proposed limitation of the word "terminating." The plain language of the claim requires only that the direction of concentrated detergent [\*63] solution terminate just after the machine senses that the fabric has reached a "full saturation level at said spin speed." Nothing in the claim language limits the word "terminating" to any particular reason or cause, so long as the machine senses that the fabric is fully saturated, and LG has pointed to nothing in the intrinsic evidence suggesting differently. Also, LG does not contest Whirlpool's construction of "full saturation at said spin speed" as meaning that the fabric has absorbed sufficient detergent solution so as to come to equilibrium saturation at that particular spin speed. LG points out that its machine's system of pooling clothes in solution makes it impossible to "sense" whether the clothes are "fully saturated," but that is an argument (perhaps a strong one, given this Court's ruling on the meaning of "sensing") for the infringement case, not for claim construction.

Accordingly, the Court adopts Whirlpool's construction of these claim terms.

### 10. Fresh Water Added To Cool Said Fabric

The meaning of the phrase "*fresh water is added to cool said fabric*" is in dispute. It appears in the following context: "prior to draining said lesser concentrated detergent [\*64] solution from said wash chamber, *fresh water is added to cool said fabric*" (['370 patent](#), claims 4, 11.)

Whirlpool argues for the following construction: "This claim element means that prior to draining, fresh water is added to the washer and the fresh water has the effect of cooling fabric in the washer, regardless of the reason for added the fresh water."

LG seeks the following construction: "Fresh water (i.e., not a solution of water and another additive) is added for the intended purpose of cooling the fabric and not added for other purposes."

The primary dispute with respect to this phrase is whether it establishes a limitation that fresh water be added with the intention or purpose of cooling the fabric. The Federal Circuit held in [Dow Chem. Co. v. Mee Indus.](#), 341 F.3d 1370, 1380 (Fed. Cir. 2000) that "the motive of the accused infringer when performing a claimed method is simply not relevant." Based on Dow, Whirlpool argues that even if water is added for an entirely different reason than to cool the fabric, infringement would not be avoided because the reasons why water might be added are irrelevant. However, Whirlpool's reliance on [Dow](#) is misplaced. [\*65] Dow was a patent infringement decision, rendered after the claims had been construed, which stands for the proposition that a person who practices a claimed method infringes regardless of the person's subjective intent or motive. The present action, in contrast, remains at the claim construction stage, where the Court's task is not to determine infringement, but rather the proper interpretation of the claims. Dow thus has no bearing on the issue now before the Court.

The Court concludes that the plain and ordinary meaning of the phrase is that the purpose clause, "to cool said fabric," necessarily modifies the clause describing the action, "fresh water is added." No other construction of the language makes sense. Thus, the Court construes the language to contain LG's proposed limitation and rejects Whirlpool's attempt to delete it from the claim. Intrinsic evidence only serves to confirm the purpose limitation. The patent specification describes the cooling purpose for the addition of fresh water: "In some embodiments, where extremely high temperatures are used during the tumble wash, water is added at the end of the tumble wash cycle to cool the clothes load, and the [\*66] wash water." ([370 Patent](#), col. 8, lines 38-41.) (emphasis added) Elsewhere in the patent, Whirlpool discusses the introduction of water for purposes other than cooling the fabric, such as to dispense fabric softener during the spray rinse. ([370 patent](#), col. 9, lines 36-41.) It is therefore clear that when Whirlpool added the purpose language to the claim, it did so for a reason and meant it to require that the fresh water actually cools the fabric.

Another point of dispute concerns the meaning of "fresh water." Whirlpool says "fresh water" simply refers to water that is added to the washer from outside (i.e., the tap), and what happens to the water once it enters the washer, such as whether it flows through a bleach dispenser or acquires detergent residue, is irrelevant. LG argues that "fresh water" means clear water only, not a solution of water and some other additive or wash water residue. Neither party offers dictionary definitions for the term, and the Court concludes that its meaning is ambiguous and thus looks to intrinsic evidence. In the [370 patent](#) specification, the only disclosed method of adding fresh water is through the detergent or wash additive

dispensers, which [\*67] necessarily means that "fresh water" must be construed in accordance with Whirlpool's proposal, as it would be impossible for "fresh water" as understood by LG to enter the machine. ([370 patent](#), col. 3, lines 12-24.) The word "fresh" in the claim takes on a meaning something like "new" or "additional" or "more."

Accordingly, the Court construes the phrase "fresh water is added to cool said fabric" as requiring that the water be added for the purpose of cooling the fabric (i.e., the Court adopts LG's proposed construction). However, the term "fresh water" does not mean clear water without any additives or wash residue (i.e., the Court adopts Whirlpool's proposed construction).

### 11. Rinsing by Spraying

The construction of the phrase "*rinsing by spraying*" is in dispute. It appears in the following contexts: "*rinsing said fabric by spraying water directly onto said fabric and recirculating water to said wash chamber by spraying and recirculating water directly onto said fabric*" and "*rinsing said fabric by adding water by spraying water directly onto said fabric and recirculating water by spraying water directly onto said fabric to and within said wash chamber.*" (718 [\*68] patent, claims 1, 6.)

Whirlpool seeks the following construction: "This claim step means that the fabric is rinsed by spraying water directly onto the fabric, and as the rinse water drains from the fabric it is pumped back through the sprayer to form a recirculating spray of rinse water that is then sprayed directly onto the fabric. This does not require that the water is absolutely free from any residual or remaining detergent solution, or that the water may not have contacted the fabric in the wash chamber, prior to rinsing."

LG argues for the following construction: "Rinsing the fabric in the wash chamber by spraying fresh water directly onto the fabric and recirculating rinse water to the wash chamber by spraying the recirculating rinse water directly onto the fabric" and "rinsing the fabric in the wash chamber by added fresh water by spraying fresh water directly onto the fabric and recirculating rinse water by spraying rinse water directly onto the fabric."

The dispute here is whether the term "water" means "fresh water." The claim never uses the term "fresh," specifying only that "water" is sprayed and recirculated during the rinsing step, but LG argues that the claim should [\*69] be construed as containing the "fresh" limitation for two reasons. First, in LG's view, the ordinary meaning of the claim term "rinse" does not include flushing with dirty or soapy water. See MERRIAM-WEBSTER'S COLLEGIATE DICTIONARY ("rinse" means "to cleanse (as of soap used in washing) by clear water"); THE AMERICAN HERITAGE DICTIONARY



OF THE ENGLISH LANGUAGE ("rinse" means "to remove (soap, for example) by washing lightly in water"). Second, LG argues, the only disclosed embodiment in the '718 patent specification recites a "fresh" water limitation, stating: "In step 524, the *fresh water's* sprayed directly onto the spinning clothes load. The water dilutes the detergent in the clothes as it passes through the load and basket. The rinse water drains down into the tub and is pumped back through the nozzle 51 to form a recirculation loop." ('718 patent, col. 9, lines 14-19.) (emphasis added). Third, LG contends, Whirlpool represented in the prosecution history that the claim required a first "fresh water" spray and then a recirculating rinse water spray: "As claimed in Independent claims 1 and 6, *fresh water* and then recirculated rinse liquor is sprayed directly onto the fabric [\*70] while the fabric is tumbling and then the water is drained." (Whirlpool Response Br. at 12.) (emphasis added). Moreover, Whirlpool told the examiner that the prior art did not suggest "spraying of *fresh water* at a tumble speed" as "required by one or more of the claims." (Amendment at 16, LG Br. Ex. 8.) (emphasis added). n3 LG points out that "a deviation [from the ordinary meaning] may be necessary if a patentee has relinquished a potential claim construction in an amendment to a claim or in an argument to overcome or distinguish a reference." [Interactive Gift Express, Inc., v. CompuServe, Inc.](#), 256 F.3d 1323, 1331 (Fed. Cir. 2001) (internal quotation marks and citation omitted).

n3 Whirlpool suggests that the use of the word "fresh" during patent prosecution was in error and should not impact claim construction, citing [Intervet Am., Inc. v. Kee-Vet Labs., Inc.](#), 887 F.2d 1050, 1054 (Fed. Cir. 1989) ("When it

comes to the question of which should control, an erroneous remark by an attorney in the course of prosecution of an application or the claims of the patent as finally worded and issued by the Patent and Trademark Office as an official grant, we think the law allows for no choice. The claims themselves control.").

[\*71]

The Court concludes that the claim step requires a rinse spray of "fresh" water, but as the Court has already discussed, the word "fresh" is not limited as LG desires. Instead, "fresh water" only means newly added water brought into the machine through cold water valves 45 and 76 and channeled via the detergent dispenser. The limitation does not require that the water sprayed onto the fabric is absolutely and perfectly free from any residual detergent solution. Instead, the "fresh water" may contain some residual detergent solution, and it may come in contact with the fabric as it passes to the bottom of the washer. In short, "fresh water" means water newly brought into the machine from the outside.

### III. Conclusion

The Court construes the disputed claim terms as set forth above for the reasons stated.

An Order consistent with this Opinion will follow.

Dated: August 2, 2004

/s/Gordon J. Quist

GORDON J. QUIST

UNITED STATES DISTRICT JUDGE



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